40 Rock

POPULAR Computing WEEKLY

35p 9 December 1982 Vol 1 No 34

This Week

Atari software
Tony Bridge looks at some of the Christmas offerings for the Atari 400/800 micro
See page 12

Vic20 tape index
John Ingham's index routine enables you to sort through a number of programs on one tape.
See page 23

Dragon art
Four random art generation programs from Dave Windle take you into the realms of Dali and Picasso
on page 25

Ivan Berg
David Kelly profiles Ivan Berg, the software mastermind who is bringing programs from the stars
See page 11

Lunar Lander
Have you ever wondered what it would be like to be an astronaut? Find out in Gordon Cooper's new game for the 16K Spectrum and 1K ZX81
on page 8

News Desk

Torch Z80 disc pack

Torch prices drop in line with costs

TORCH Computers has slashed the prices of its product range by up to 30 per cent.

The price of the Torch computer system drops from £4019 to £2795 and the price of the Torch Z80 disc pack falls from £1144 to £895.

Director Martin Vlelund-Boddy explained "I'm just getting more competitive!" Part of the reason for the price drops is reduced manufacturing costs. Torch recently took over the factory and some staff of the now defunct Arfon Computers in Caernarfon. This has meant that Torch can now itself undertake some of the manufacture, rather than subcontracting the work out.

At £895, the Torch twin-disc 800K drives, operating system and Z80 card is the cheapest way of running CP/M software on the BBC micro, with which it is compatible.

Northern fair

OVER 5000 people turned up to the first day of the *Northern Computer Fair* in Manchester on November 25-27. Little new hardware or software of any note was launched and the established names in the market such as Atari, Sinclair and Commodore stayed away from the exhibition, sceptical of promised crowds of up to 20,000.

The new companies such as Dragon Data and Lynx built impressive displays and reaped the rewards of attending the first major computer exhibition outside London. Quicksilva's spectacular new *4D Time* gate program was undoubtedly the star attraction.

Picturesque, Bug-Byte, A&F Software, Artic and Macronics displayed their existing range of products, with special Christmas discounts for customers at the fair.

The *Northern Computer Fair* is part of an attempt by IPC, the international publishing conglomerate, to shake the *Personal Computer World Show's* dominance of the exhibition market.

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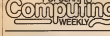
SWAP Brand new Jupiter Ace all leads and manual for 16K ZX81 + printer Tel Halifax 249181 Mr M Wells

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9 December 1982 Vol 1 No 34

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How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long The articles and any accompanying programs should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

All submissions should be typed and a double space should be left between each line Please leave wide margins

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your program returned you must include a stamped addressed envelope

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week

Editorial

There have been cries in certain quarters to restrict the import of foreign micros Representations have already been made to the government to this effect

Protectionism is an issue that has implications spreading far beyond the world of micros Differing groups have tried to ban the import of foreign cars, steel and even football players

The protectionist argument is that we must preserve our domestic industries from unfair competition Countries which dump their goods on Britain at ridiculously low prices must be stopped If France can force Japan to sell its video recorders through one tiny customs post, effectively reducing the flow of imports to a trickle, so can we

But, the obverse of this coin is that if we ban other people's goods they will ban ours Thus you may limit imports, but you will also restrict exports

Whatever the merits of the protectionist argument, it is not one that applies to the home micro industry This is one of the few fields where Britain actually leads the rest of the world Far from worrying about imports, we should be out selling our micros to the Americans, the Japanese and everyone else

Next Thursday

In our special Christmas issue, Stephen Adams looks at the pros and cons of QSave — a combined hard and software device which can dramatically speed up loading and saving on the ZX81 He also reviews the LMX Prom programmer for the ZX81

Also next week, Asghar Ahmed tests your knowledge of anatomy with a skeleton program for the Vic20.


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Bob Maunder
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Bob Maunder is co-author of The ZX80 Companion and author of The ZX81 Companion. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science and is a Member of the British Computer Society.
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Curb on foreign micro imports

MICROCOMPUTER manufacturers plan to lobby Prime Minister Margaret Thatcher for more support for their industry

The recently formed British Microcomputer Manufacturers Group (BMMG) has written to the Prime Minister indicating that help is urgently needed to ensure a future for micro manufacture in the UK. The BMMG is asking for legislation to control the flood of imported Japanese and American microcomputers and a firm buy-British commitment in Government purchases

The increasing number of foreign imported micros is seen by the BMMG as a major threat. Commodore's Vic20 machine is now the world's top selling micro and Hitachi, Casio, Sanyo, Sharp and Sord all have new products planned for launch

The decision to seek Government support for their cause comes after the disclosure that of the 25 approved suppliers for public contracts only five are British. The Central Computer and Telecommunications Agency, the body responsible for choosing the approved companies, is at the moment drawing up a revised list. The BMMG's action is intended to influence this selection

The group has 20 members — but neither Acorn Computers, Camputers, Dragon Data, Grundy nor Jupiter Cantab are included

Ironically, the only major home computer manufacturer among the BMMG's membership — Sinclair Research — is openly critical of its action

"We are selling well in the UK despite overseas competition and since well over half of our manufacture is for export it would certainly not be in our interests to see the introduction of import quotas on micros," said a Sinclair spokesman

"In essence the Government has a buy British commitment already — just look at the machines included in the Government's Micros in Schools Schemes," he added

Reaction from some non-member manufacturers has also not been favourable. Martin Vhieland-Boddy of Torch Computers, commenting on the proposal for import restrictions, said "It is disgusting. If you cannot compete in an open market then it is a reflection on your company — and not on the government"

ZX Speech Synthesizer

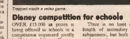
Speaking of Sinclair . . .

THE Chatterbox is a new speech synthesizer compatible with the ZX81 and ZX Spectrum microcomputers

Built by William Stuart Systems, the unit has a virtually unlimited vocabulary. It uses the technique of phoneme synthesis where each word is broken down into a comparatively small number of sounds — vowels, dipthongs and consonants

Any word can then be formed from these components. The module can hold a word typically in about six bytes — in 10K about 1,600 words can be stored

The Chatterbox costs £49 plus VAT and is available from William Stuart Systems, Dower House, Herongate, Brentwood, Essex



Trapped inside a video game

Disney competition for schools

OVER £15,000 in prizes is being offered to schools in a competition organised jointly by Disney and Acorn Computers

The competition involves writing an idea for an adventure game, based on the new video-game movie from Disney — *Tron*

The competition is open to both primary and secondary schools. Primary school entries must describe a plot of a game in 100 sentences of 10 words or less

There is no limit on the length of secondary school submissions, but both written and visual representation should be included. No knowledge of programming is required — all that is wanted is a good idea and a vivid imagination

The winner will receive as a first prize an Acorn BBC model B microcomputer with discs and teletext adapter

Details of the competition can be obtained from Acorn Computers



IT Andromeda Zita-P

IT launch new portable micro

IT COMPUTER Services Ltd of Staines has launched a series of portable micros to rival the Osborne I

The Andromeda Zita-P, bottom of the range at £995, includes a 10 inch display, full Qwerty keyboard and 125K disc drive. The package comes in an aluminium carrying case which is hinged to provide access to cables and interfaces

This compares with the Osborne 1 which costs £1,250 and includes two 5¼ inch floppy disc drives and an RS232C interface

At the other end of the scale the Andromeda Zita P 4 3 costs £2,095 but includes three integral drives, each with 1Mbyte capacity

Dragon move attacked by MP

A LABOUR MP has hit out against Dragon Data's intention to move away from unemployment torn Swansea

Alan Williams, Labour MP for Swansea West, has criticised the decision in a letter to Welsh Secretary Nicholas Edwards. "It is no good Thatcher and Tebbit telling the unemployed to get on their bikes if you are putting our jobs on the backs of lorries," he said

Dragon Data plans to move to premises provided by the Welsh Development Agency at Kenfig Industrial Estate in South Glamorgan. The company hopes to switch locations in mid-December

Dragon to get disc drive

LONDON-based Compusense has developed a 5¼" disc drive for the Dragon 32 microcomputer

Single or twin double density drives should be available from mid-January. Complete with serial port (RS232C) and Flex operating system, the disc drives start at £450, excluding VAT

Compusense has also developed a machine code monitor for the Dragon which allows you to write assembly language programs. It costs £18.40 including VAT and postage

Straight from the shoulder

As a first time reader of your weekly and a member of the Spectrum waiting list, I was alarmed by the anti-Sinclair tone of your November 4 issue. In your columns I read that the Spectrum was rejected by educationalists, spurned by readers and damned in your editorial.

Surely the Spectrum cannot be all that bad? Is there anyone who can convince me that I am not wasting time and money in the Spectrum queue, and that I should spend more for the same now, or spend less for less now? Or have I been hoodwinked by the Sinclair publicity machine? Or am I being misled by the anti-Sinclair band wagon? The Spectrum seems to polarise people into strong pro-and-anti camps over all manner of issues, very few of which seem to have any bearing on whether it is or is not a good micro-computer.

J Blake
61 Queens Road
Tunbridge Wells
Kent

The Spectrum is not all that bad, quite the reverse. The Spectrum is a very good machine. To quote from our editorial of November 4 "Pound for pound the Spectrum still offers one of the best deals in the microcomputer market".

The problems associated with the Spectrum in the main concern its lack of availability and poor quality control. Rectify these problems and the Spectrum is still a very attractive proposition.

As for the rejection of the Spectrum by most local education authorities, I feel this reflects more on the failings of the Department of Industry's "Micros in Primaries" scheme than on the Spectrum.

. . . and here's another

After reading the comments in recent copies of your magazine concerning the deliveries of the Spectrum computer and the attitudes of Sinclair Research Ltd, I should like to record my own experience of this company.

A great deal of deliberation between my sons and myself resulted in an order being placed for a 16K Spectrum last September, knowing that the delivery was likely to be extended. A phone call to Sinclair during the first week in October, after receiving their standard letter of confirmation of order, produced an extremely polite response and a delivery date of the first week in November.

The unit duly arrived on Saturday, November 6. It has worked perfectly since being switched on. The sound is adequate and the colour excellent. The quality of the display on the tv screen is far better than the Vic20 and Dragon on show in the local stores.

As far as I am concerned, the company has kept me informed of their difficulties and have answered my telephone calls with an immediate and polite response. After all, what other company gives you piped music while the telephone operator is busy, and has met the delivery date given to me.

The only letters I have seen printed, to date, are those of an adverse nature and I hope that this letter will help to restore the balance.

M S Tapp
3 Brookside
Cornford Lane
Pembury
Kent

We are only too pleased to publish your letter. Sinclair has undoubtedly come in for a lot of criticism lately and we are glad to be able to show that there is another side to the story. If Sinclair had treated all his customers in the same way, much of this criticism would never have arisen.

Everything in a name

I would just like to make it clear that I, the author of *Scribble* for Spectrum (published November 4), am Terence R Wiley of 1 Watson Gardens, Howdon Wallsend, Tyne and Wear, and not *Anonymous*.

T R Wiley
1 Watson Gardens
Howdon
Wallsend
Tyne and Wear

Mum's the word.

Bugged in on Spectrum

Since reading about bugs in the Spectrum in *Popular Computing Weekly*, I have come up with one.

(1) Switch on Spectrum and press *Enter*
(2) Change the flashing K cursor to a E cursor
(3) Press 6 (yellow) and you will notice that the cursor flashes black and yellow
(4) Press *Delete* (caps shift and 0) and you will notice that the cursor changes back to normal, but is positioned in the middle of the bottom line

Now try this with other colours and it does not work (nb 9 stands for white and 7 does not change the cursor). Is this just my Spectrum not working, or is it a real Spectrum bug and in that case am I not a clever little brat?

David Edwards
118 Middle Crockerford
Vange
Basildon
Essex

Award goes to Automata

From reading your latest issue, I see other prospective Spectrum owners are fed up with waiting for delivery. My gripe is at the software industry. As you may well know, Microl has been advertising extensively in all the computer press. I ordered one copy of *The Database* on September 6, 1982, with the promise of the dreaded 28 day delivery. Although how it can take any mere mortal more than two weeks to clear a cheque and wrap up a cassette I do not know.

After waiting four weeks, five weeks, six weeks, I received a mass printed letter saying that the program was being re-written and would not be available until mid-December. However, Microl said I would be able to have a refund if I could not wait. Two weeks ago I sent a recorded letter asking for my refund. I am still waiting.

Further to waiting three months for my Spectrum, I have found it a very good machine for my uses. However, a few weeks ago I received the software catalogue for Sinclair's own products marked *Ex-stock available now*. Four weeks have passed and I have received a card from Sinclair saying my order is being processed. This means that another three-weeks' syndrome is moving on.

But all is not lost. The N M award goes to Automata who market *Pimania*. The software arrived in under 48 hours of posting my order!!!

PS. Lets have some more business programs.

N Murray
39b St Thomas Street
Weymouth
Dorset DT4 8EH

Correct entering a must

Spectrum Disassembler. I believe that the problem your correspondent "Keith Robertson" has experienced with this excellent program is entirely to do with the lower case letters u, v, w, x and y. These *must* be entered as shown in the listing, since the program uses these lower case letters in argument editing as explained in the text. My version works!

Robin Lucas
84 Woodman Road
Brentwood
Essex

Dragon user's pleasure

I would like to thank you for starting a regular page for Dragon 32 users.

I have just successfully completed my first program which was *Flying Saucers*. I do hope we have plenty more as I am going to place a regular order at my newsagents for your magazine.

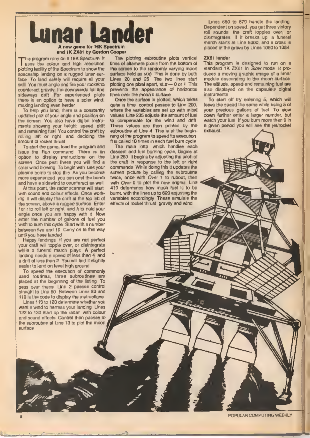
Matthew Blackwell
79 Dommon Drive
Collier Row
Romford
Essex

Rest assured. The Dragon page will be a regular feature in our future issues.

If you have an opinion you want to express, or have spotted an error that needs correcting, write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2.



Buying a home computer this Christmas?
Come in and try ours and see how they can benefit the whole family.
These personal computers really are for the whole family. For entertainment and education for the children, they're ideal. And there's certainly never been an easier way to tackle all your family accounts, or to help with routine business tasks. So come in and try them out.
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Lunar Lander

A new game for 16K Spectrum and 1K ZX81 by Gordon Cooper

This program runs on a 16K Spectrum It uses the colour and high resolution plotting facility of the Spectrum to show the spaceship landing on a rugged lunar surface To land safely will require all your skill You must angle and fire your rocket to counteract gravity the downwards fall and sideways drift For experienced pilots there is an option to have a solar wind, making landing even harder

To help you land, there is a constantly updated plot of your angle and position on the screen You also have digital instruments showing your height speed drift and remaining fuel You control the craft by rolling left or right and deciding the amount of rocket thrust

To start the game, load the program and issue the Run command There is an option to display instructions on the screen Once past these you will find a solar wind blowing To begin with use your plasma bomb to stop this As you become more experienced you can omit the bomb and have a sidewind to counteract as well

At this point, the radar scanner will start with sound and colour effects Once working it will display the craft at the top left of the screen, above a rugged surface Enter *l* or *r* to roll left or right and *h* to hold your angle once you are happy with it Now enter the number of gallons of fuel you wish to burn this cycle Start with a number between five and 10 Carry on in this way until you have landed

Happy landings If you are not perfect your craft will topple over, or disintegrate while a funeral march plays A perfect landing needs a speed of less than 4 and a drift of less than 2 You will find it slightly easier to land on level high ground

To speed the execution of commonly used routines, three subroutines are placed at the beginning of the listing To pass over these Line 2 passes control straight to Line 80 Between Lines 80 and 110 is the code to display the instructions

Lines 110 to 120 determine whether you want a wind to harrass your landing Lines 122 to 130 start up the radar with colour and sound effects Control then passes to the subroutine at Line 13 to plot the moon surface

The plotting subroutine plots vertical lines of alternate pixels from the bottom of the screen to the randomly varying moon surface held as *v(x)* This is done by both Lines 20 and 26 The two lines start plotting one pixel apart, at *z* — 0 or 1 This prevents the appearance of horizontal lines over the moon's surface

Once the surface is plotted, which takes quite a time control passes to Line 200, where the variables are set up with initial values Line 235 adjusts the amount of fuel to compensate for the wind and drift These values are then printed by the subroutine at Line 4 This is at the beginning of the program to speed its execution It is called 10 times in each fuel burn cycle

The main loop which handles each descent and fuel burning cycle, begins at Line 250 It begins by adjusting the pitch of the craft in response to the left or right commands While doing this it updates the screen picture by calling the subroutine twice, once with *Over* 1 to rubout, then with *Over* 0 to plot the new angles Line 410 determines how much fuel is to be burnt, with the lines up to 620 adjusting the variables accordingly These simulate the effects of rocket thrust gravity and wind

Lines 650 to 870 handle the landing Dependent on speed, you get three victory roll sounds the craft topples over, or disintegrates If it breaks up a funeral march starts at Line 5000, and a cross is placed at the grave by Lines 1050 to 1084

ZX81 lander

This program is designed to run on a standard 1K ZX81 in *Slow mode* It produces a moving graphic image of a lunar module descending to the moon surface The altitude, speed and remaining fuel are also displayed on the capsule's digital instruments

To start off try entering 5, which will leave the speed the same while using 5 of your precious gallons of fuel To slow down further enter a larger number, but watch your fuel If you burn more than 9 in a given period you will see the jet/rocket exhaust

Height Speed Drift Fuel

```
  3 REM This ...
  4 OVER 0  PRINT AT ...
  6 INK 0  PRINT AT ... INT (h
/10)
  8 PRINT AT 2,11 INT ... 10
  9 PRINT AT 3,19 INT ... 10
 10 PRINT AT 2,28,INT ((.5)/10
 11 RETURN
 12 REM This plots moon surface
 13 FOR x=0 TO 255  LET y=y+(RND*
3)-3
 16 IF y<0 THEN LET y=1
 17 LET v(x+1)=y
 20 FOR z=0 TO y STEP 2
 22 PLOT x,z
 24 NEXT z
 25 LET x=x+1  LET v(x+1)=y  PL
OT 55,y
 26 FOR z=1 TO y STEP 2
 27 PLOT x,z  NEXT z  NEXT x
 28 RETURN
 29 REM This plots lunar module
 30 INK 7
 33 IF a>0 THEN LET a=0
 36 IF a<-0 THEN LET a=-6
 40 LET b=6-ABS a
 48 LET y=h/40+v(x+1)
 49 IF y>180 THEN GO TO 72
 50 IF ABS a<3 THEN PLOT x-1,y
DRAW a,b-1
 53 IF ABS a<6 AND ABS a>2 THEN
PLOT x-1,y+(a/4)  DRAW a,b
 58 IF ABS a>6 THEN PLOT x,y-1
DRAW a-1,b
 60 PLOT x,y  DRAW a,b
 70 IF ABS a<3 THEN PLOT x+1,y
DRAW a,b-1
 73 IF ABS a<6 AND ABS a>2 THEN
PLOT x+1,y-(a/4)  DRAW a,b
 76 IF ABS a>6 THEN PLOT x,y+1
DRAW a-1,b
 78 RETURN
 80 DIM v(256)
 81 REM Setup & instructions
 82 INK 7  PAPER 0  BORDER 0  C
LS
 84 PRINT AT 7,0 "You are in de
epest space"
 85 PRINT AT 9,0 "Do you need i
nstructions on how"
 86 PRINT "to land your lunar m
odule?(y/n)"
 88 INPUT a$
 89 IF a$<>"y" AND a$<>"Y" THEN
GO TO 110
 90 PAPER 7  INK 0  BORDER 7  C
LS
 92 PRINT AT 3,0 "You must land
your lunar module gently on the
moon. You have 4 instruments w
hich show -"
 93 PRINT AT 8,3 "Height above
lunar surface"
 94 PRINT AT 10,3,"Speed of ver
tical descent"
 95 PRINT AT 12,3,"Drift from l
eft to right"
 96 PRINT AT 14,3 "Fuel remaini
ng"
 97 PRINT AT 16,0,"There is a s
pace wind blowing from left to r
ight which will slow you down
your drift. You can use a pl
asma bomb if you wish to stop
the wind"
 98 INPUT "Press enter to conti
nue";a$
 99 CLS
100 PRINT "You ... to the wh
ole module at the top left of t
he radar screen you can ro
tate left or right when happy wi
th its angle press n or just ente
r are you will then be asked h
ow much fuel to burn this cycle."
101 PRINT AT ^,0 "If your craft
is straight up answer burning
5 will leave your speed as it i
s"
102 PRINT AT 12,0 "Hint- It is
easier to land on high ground"
103 PRINT AT 15,0 "If your final
speed is less than 8 and
tilt less than 2 you have won. If
drift less than 2 you survive
but topple over"
108 INPUT "Good luck press ent
er to go";a$
110 PAPER 0  INK 0  CLS
111 LET w=INT (10*RND)+2
112 PRINT AT 3,0,"There is a ",
w;"mph space
113 PRINT "wind blowing from le
ft to right"  PRINT  PRINT "Do
you want to use your plasma bom
b to stop it?(y/n)"
114 BEEP 1,(3*w)+10  INPUT r$
115 IF r$<>"y" AND r$<>"Y" THEN
GO TO 122
116 PAPER 2  INK 7  CLS  FLASH
1  PRINT AT 11,15,"BLAST"
117 FOR z=1 TO 7
118 BORDER 7-z
119 BEEP .5,(-4*z)+10
120 IF z=2 THEN FLASH 0  PRINT
AT 16,0 "There is no longer any
wind"
121 LET ...
122 BORDER 0  PAPER 0  INK 7  C
LS
123 FOR z=-20 TO 30 STEP 2
124 FLASH 0  PRINT AT 7,0 "I wi
ll switch on the radar scar
125 PRINT AT 9,0,"Please be pat
ient its very old"
126 BEEP 1,z
127 PAPER INT ((z+30)/10)  IF I
NT (z/10)=z/10 THEN CLS
128 NEXT z
129 OVER 0  BRIGHT 0  INK 0  PA
PER 6  BORDER 0  CLS  LET y=30
130 GO SUB 13
200 PRINT "Height  Speed  Dr
ift  Fuel"
205 REM Set up initial values
210 LET h=(255-v(11))*40
220 LET v=700
228 LET a=0
230 LET d=0  RND*10)+1
235 LET f=1000+INT a+INT v ...
240 LET x=10
245 GO SUB 4
250 REM Main loop enters here
300 OVER 0  GO SUB 30
310 INPUT "Act1 R=Right L=Left,
N=None",r$
315 INK 0  OVER 1  GO SUB 30
320 IF r$="" OR r$="n" OR r$="N"
 THEN GO TO 400
330 IF r$="r" OR r$="R" THEN LE
T a=a+1
340 IF r$="l" OR r$="L" THEN LE
T a=a-1
350 GO TO 300
400 REM Plot module.
402 OVER 0  GO SUB 30
404 REM Calculate new posn.
405 INK 0
410 IF f>0 THEN INPUT "Burn how
much captain?";f
430 IF f>f/10 THEN LET f=f/10
434 REM Dett vert component
440 FOR z=0 TO 9
442 REM Rub out plot
445 OVER 1  GO SUB 30
460 LET v=v-v/40( (40- a6),540
470 LET v=v+b-(r/8)
480 LET x=x+d/20
482 IF x<0 THEN LET x=0
488 IF x>247 THEN LET x=247
495 IF x=0 OR x=247 THEN INK 0
PRINT AT 4,0 "You are about to
drop off screen"  BEEP .4,30
500 LET f=f-r
505 IF f<0 THEN LET f=0  IF f<
0 THEN LET r=0
520 LET h=h-40*(y-v(x+1))
600 IF h<0 THEN LET h=0
630 LET d=d+(real d+w 2
635 REM Show new readings
640 GO SUB 4
645 REM Plot new craft even
650 OVER 0  GO SUB 30
655 IF r>0 AND r<0 THEN BEEP
.1,r+0
660 IF h<0 THEN GO TO 650
620 NEXT z
625 IF f=0 THEN LET z=z 1
630 IF f=0 THEN GO TO 440
640 GO TO 200
650 REM Landed
665 IF v>40 THEN GO TO 1000
668 PAPER 2  INK 7  FLASH 0
670 FOR z=0 TO 6
675 PRINT AT 4+z 0
680 NEXT z
690 PRINT AT 6,10, WELL DONE
700 IF a<40 THEN PRINT AT 7,0
"You landed safely"
710 IF d>20 AND d<40 THEN PRINT
AT 8,0, "But TOPPLED OVER"
711 IF d<-20 AND d>-40 THEN PRI
NT AT 8,0, "But TOPPLED OVER"
720 REM This flashes colour &
        plays victory roll
730 FOR z=1 TO 3
735 IF a>20 THEN LET z=3
740 FOR j=0 TO 7
750 BORDER j
760 BEEP .1,(j*3)+(z*8)
770 NEXT j
780 NEXT z
785 IF d<=20 AND d>=-20 THEN GO
TO 8000
786 IF d>40 OR d<-40 THEN GO TO
1000
795 FOR z=1 TO 6
796 OVER 1  GO SUB 30
800 IF b 0 THEN LET a=0
810 LET a=a+1
820 IF a>7 THEN LET a=-7
830 OVER 0  GO SUB 30
840 BORDER (7-a)
850 BEEP 1,(-2*z)
852 NEXT z
872 GO TO 8000
1000 REM Crash
1005 OVER 1  GO SUB 30
1010 FOR z=1 TO 100
1020 LET r=RND*8
1022 LET d=v(x+1)+r-z 4
1023 IF d<0 THEN LET d=0
1024 IF d>255 THEN LET d=255
1025 LET h=y+z/(4+(1+r))
1026 IF h 0 THEN LET h=0
1027 IF h 160 THEN LET h=160
1030 OVER 0  INK 2  PLOT d,h
1040 NEXT z
1050 INK 0  PLOT x,y  DRAW 0,12
1060 PLOT x-1,y  DRAW 0,12
1070 PLOT x+1,y  DRAW 0,12
1080 PLOT x-4,y+7  DRAW 8,0
1082 PLOT x-4,y+6  DRAW 8,0
1084 PLOT x-4,y+2  DRAW 8,0
1086 PRINT AT 6,9, "WHAT A CRASH!"
1090 REM Funeral march follows
5000 BEEP .5,0  BEEP .2,2  ...
4,3  BEEP .4,2  BEEP .5,0
5010 BEEP .5,0  BEEP .2,2  ...
4,3  BEEP .4,2  BEEP .5,0
5020 BEEP .5,3  BEEP .2,3  ...
1,8,7
5030 BEEP .5,5  BEEP .5,5  ...
1,8,7
5040 BEEP .5,7  BEEP .2,8  ...
4,8  BEEP .4,3  BEEP .4,2
1,8
5050 BEEP .5,7  BEEP .2,8  ...
4,8  BEEP .4,3  BEEP .4,8
.6,0
5060 BEEP .5,5  BEEP .2,-5
1,8,0
5070 BEEP .5,0  BEEP .6,-5
1,8,0
8010 INPUT "Another go? (y/n)";a
$
8030 IF a$="n" OR a$="N" THEN ST
OP
8040 GO TO 110
9000 REM Moonlander © G Cooper
          1982
     Variables -
   v    Vertical speed
   w    Wind speed
   h    Height above surface
   d    Drift + to right
   f    Fuel
   r    Fuel burnt this cycle
   a    angle from vertical
   b    angle 90 degrees-a
   x    x axis plot 0 to 255
   y    plot height
   v(x) Surface height at (x)
   z    loop variable
```

ZX81 Lander

ALT SPEED FUEL

814   65   99

```
  1 LET H=8000
  2 LET U=750
  3 LET F=100
  4 LET R=0
  5 LET Z=10 7-H/800
  6 CLS
  7 PRINT TAB 0, "ALT SPEED FUEL"
  8 PRINT AT 21,0,"..."
  9 PRINT AT Z,2,"..."
 20 PRINT
 22 IF Z>10.5 THEN PRINT AT ...
 23 IF R>=10 AND Z>=20 THEN PRI
NT ...
 40 PRINT AT 2,5,INT (H/10)
 42 PRINT AT 2,11 U/10
 44 PRINT AT 2,18 F
 45 IF F>0 THEN INPUT R
 46 IF R>F THEN LET R=F
 50 FOR T=1 TO 10
 52 LET H=H-U/10 (5-R)/8
 54 IF H<=0 THEN GOTO 60
 56 LET U=U+5-R
 58 NEXT T
 59 LET F=F-R
 60 GOTO 5
 65 IF U>=80 THEN PRINT "CRASH"
 68 IF U<=40 THEN PRINT "..."
 70 IF U>=41 AND U<=79 THEN PRI
NT "VERY BUMPY"
 72 PRINT U 10 "MPH"
 74 PAUSE 500
 76 RUN
```

Software from the stars

***David Kelly** talks to Ivan Berg about his burgeoning software business*

After ten years in the audio publishing business Ivan Berg has built up an enviable catalogue of the spoken word on cassette.

Albert Einstein, Suzzanah York, Paul Eddington and Reginald Bosanquet

Within 12 months Ivan has applied the same expertise to the software publishing business with dramatic success. Software publishing now takes up nine tenths of his resources. In short, he knows his personalities

It all began when Ivan bought a Vic20 microcomputer for his son last Christmas. "I discovered that programming was not the closed book I thought it was," he says. "I thought about us doing some software — after all we have the publishing, audio and cassette know-how and all that was missing was the computer expertise. My brother has been working with mainframes for 15 years and, when I explained my ideas to him, that's when it all started

"We approached Commodore with a view to producing software in association with them and they were very receptive. Their system was chosen because of its dedicated cassette. We would need to load up to 40K of data for each program, in 8 or 16K blocks, so reliable loading was vital

Less than four months after their first program went on sale, Ivan and his brother find themselves with a flourishing software catalogue of mainly educational programs designed for both the 6K and 16K Vic20 microcomputers. Their software personalities now include Robert Carrier, Professor Eysenck, Robert Robinson and Patrick Moore

Part of the company's success in what was an alien industry must be due to its approach — an approach radically different from that customarily taken by software houses

Ivan takes the traditional computer program production method and turns it inside-out. Under his control, the company treats software like a book — starting with an idea, commissioning an author to write the 'story' of the program and reducing the programmer's role to one of translator, bringing the author's plan to the screen

First comes the idea. Says Ivan: "I can come up with hundreds of ideas; the problem is choosing the best. A successful project must combine several features — it must have some practical use and be interesting, it must entertain more than one person and, most importantly, it must already have proved to have been popular

Ivan Berg: ideas man

in another medium, tv, film, radio, magazine or book.

"As far as possible the buying public must recognise the name, title or personality involved. When we first started we looked for books that already existed which would lend themselves to conversion into computer programs. We identified these very quickly — Know Your Own IQ, Know Your Child's IQ, and Know Your Own Personality

'Because of the reputation we have built up in audio publishing, agents and personalities were aware of us. For the Know Your Own Personality program we had to deal with Penguin Books and all our educational software is produced in association with Hodder and Stoughton Educational. The same thing happened with the BBC. Mastermind seemed to have good possibilities — having a central figure the programme was ideal for conversion to a computer"

Each idea is considered by Ivan and his brother to decide if it can be made to work as a computer program. At this stage Commodore are also involved to endorse the idea in principle

It is only after the basic plan for the program has been accepted that an approach is made to an author. The person selected will be the author who is best able to write the story of the program — what the user will actually see — and he need not have any knowledge of computer programming

'At the moment we only have two programmers working for us," explains Ivan. "But, by mid-December we will have at least 10 more on contract and we are in the process of appointing a full-time in-house editor." The programmers must work as closely as possible to the author's original script and the work must be completed within a strict time schedule — usually within four or six weeks. Then the program is checked for editorial inaccuracies — spelling mistakes and the like — and is de-bugged

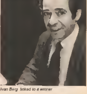
When this is complete, we take the program over to Commodore and they also check it for bugs. So far we have had no problems — they have accepted every program we have given them

"We now have 14 programs on sale, with another 12 in various stages of production. The problem is producing them fast enough. All our programs released through Commodore in August and November are on their second reprint. What has staggered us more than anything has been the runaway success of our GCE O level revision programs

'Commodore US are licensing all our software and we will be changing our educational material to fit in with the American high school syllabuses

I am sure that the Vic20 will continue as long as there is a demand for it. Commodore has now recovered all its tooling costs from its manufacture and there is room for a further price reduction after Christmas — perhaps down pretty close to the £100 mark!

"We are also working on versions of all our programs for the Commodore 64. And we will also be doing a range of 'professional' software packages for it — a Menu Planner for the catering trade, an Interior Designer which designs rooms on-screen and shows the different elevations, and a Professional Money Manager Program. These will be disc-based



Ivan Berg: linked to a winner

'We also have a Mind and Body diet and fitness program, an Astronomy program which will display the seasonal star fields, and we shall be looking at law and medicine programs. All these will be available in some form on the Vic20 as well

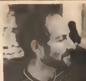
'For the future we are looking at electronic banking and at the possibilities of the video-disc/computer combination

Unfortunately we cannot be all things to all men. We either expand rapidly and quadruple our production problems or stick with the one company — Commodore

'I hope we have linked ourselves to a winner! It would have been preferable to have been able to join up with an all-British company, but there wasn't one when we first started. And there still isn't one with a dedicated cassette deck, which we think is vital ■

Advent of Owari

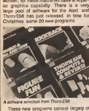
***Tony Bridge** looks forward to Christmas on his Atari*



Tony Bridge contentment

Christmas 1982 looks like being a very interesting one for the computer consumer. Hard- and software are more plentiful than ever before and bargains abound. ("Dear Santa, I would like a toy train, a space gun and a computer ...")

The Atari series of computers has a dedicated band of followers and little wonder, for these machines have a superior graphics capability. There is a very large pool of software for the Atari and Thorn/EMI has just released in time for Christmas some 20 new programs.



A software selection from Thorn EMI

These new programs consist largely of games as most personal software does. All the programs are superbly packaged as one might expect from a company with connections in the record industry. Sturdy high-density plastic boxes, reminiscent of videocassettes, protect the cartridge or cassette within. And the instructions come in superbly-designed booklets.

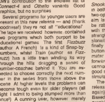
These packages are an object lesson, to other manufacturers, in eye catching appeal. One day in the not-too-distant future, software will be sold, like books or records, in racks, and all programs will have to be as well-packaged as this present batch.

You will not find any space games in the present collection nor any adventures (the zappers and axe-getters are, of course, well-catered for by other manufacturers as we shall see later). No, most of the programs here are "thinking" games.

Let's start by looking at a couple of games usually played in the quiet of the local pub, with a pint and a packet of crisps the only playing aids. *Cribbage* and *Dominoes* are contained on one tape. *Cribbage* (author J Smith) is played against the computer, which also takes care of the scoring. The scoring is done on a board with "pegs", just as in real life. *Dominoes* (author J Smith again), too, is played against the computer, which proves a fairly strong opponent in both programs.

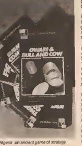
The next cassette contains two games that take you right out of the pub. The first, *Owari* (author A Howard), is the ancient African game of strategy in which seeds or stones are moved around two rows of cups. Two players can play or one against the computer, and the idea is to capture your opponent's seeds. Sounds simple but you'll need your wits about you! The other game on this tape is *Bull and Cow* (author A Howard), which is just a *Mastermind* game, using little bulls and cows instead of black and white pegs.

Compute 4 (author K Buckner) and *Reversi* (author A French), are Thorn/EMI's contribution to the endless list of *Connect-4* and *Othello* variants. Good graphics, but no surprises.

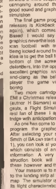


Several programs for younger users are present in this new release — and (thank goodness!) they're not all "educational". The tape we received, however, contained two programs which both purport to be educational games. The first, *Fizzbuzz* (author A French) is a kind of Snap-by-numbers, whilst *Train* (author as *Fizzbuzz*) has a little train winding its way through the hills dragging a series of number-coaches behind it. You are expected to choose correctly the next number in the series from those above the scene. At higher levels the problems can become tough even for older players (all right, I admit to being stumped more than once!) A cunning user, however, merely needs to run through each option until the right answer is hit upon by luck. No explanation is given as to how the correct solution should be reached. Therefore a mere diversion, and not a useful educational tool.

Moving on to reaction games we find *Snooker* and *Billiards*. Very good graphics in both programs, but a rather awkward two-operation shooting method. First the aim is to set up (and this in itself can be rather hit and-miss, excuse the pun, with the conventional joystick), then the strength of the shot is estimated. Occasionally one becomes so overjoyed at finally getting the aim right, that the "fire" button is pressed before the strength-meter is properly set and the ball trickles forward a mere couple of inches or goes cannoning around the table. However good sound and graphics make for a good simulation.



From Nigeria: an ancient game of strategy



The final game program in this batch of releases is *Kickback* (author A French, again), which comes in cartridge form. Based, I would say, on *Breakout*, the graphics nevertheless remind me of American football, with an oval shaped ball being kicked around from men to man. The idea is to get the ball from your men at the bottom of the screen, through all the defenders, into the opposing goal. Despite excellent graphics and a satisfying flash-and-clang as the ball rebounds from a player, the game very soon becomes boring.

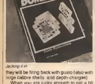
Two more cartridges wind up Thorn/EMI's Christmas release. *Jumbo Jet Pilot* (author H Samara) is, as the name suggests, a Flight Simulator program; as a real fan of these I approached this cartridge with anticipation.

As one has come to expect from an Atari program, the graphics are outstanding. After selecting your skill level (Capt Bill Smith of BA can start at 5, the rest of us, at 1), you can look at your instrument panel which consists of an array of dials and information. A very comprehensive instruction book will help you decipher these however, and then you can take off.

Your mission is to navigate your Jumbo to the landing strip at the other side of the map. The simulator is broadly realistic in its flight characteristics (can you loop the loop in a Jumbo?) but ultimately, I'm afraid, boredom sets in — a couple of hours is needed to get even halfway across the map, and straight and level flight at this sort of time scale is fairly unexciting. As a tyro, I could be doing something wrong, of course!

Submarine Commander (author D Lock) is my personal favourite from this present release The player is put in charge of a submarine patrolling the Mediterranean in search of enemy ships to destroy (from the saloon bar to a Jumbo to a submarine — anything can happen with an Atari!)

At the start the instrument panel is displayed Fully as complex as the Jumbo s things are nevertheless made clear in the instruction book A map of the area may also be called up which shows the sub s position and that of all the shipping Once on an attack course, a periscope view may be selected Of course you are not allowed merely to skulk around shooting off torpedoes at the enemy willy-nilly —



Jacking it in

they will be firing back with gusto (also with large calibre shells and depth-charges)

When you are lucky enough to get a hit with your torpedo you will see through your periscope the unfortunate vessel still firing at you as it sinks beneath the waves

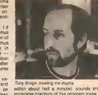
The score given at the end of the game is dependent upon tonnage sunk, number of torpedoes used time taken and so on The graphics in this program are outstanding even in such exalted company

From Synapse Software (wish I d thought of that name) comes *Shamus* (author William Mataga) a combination of arcade and adventure Your little Shamus has to negotiate twisting corridors in search of The Key He is not alone — Spiral Drones and Snappers to mention only two of the orrible beasties come after your man in gangs and which of course must be shot down

Scattered around the corridors are various treasures like Extra Lives Keys and Mystery Question Marks which can be picked up or left Once all the beasties have been disposed of however the dreaded Shadow immediately comes out of hiding and rushes towards you And he will kill your man unless you get him off to the next screen fairly sharpish!

Scott Adams Adventure International is the company responsible for *Preppie* (author Russ Wetmore) This is the game in which frog-lovers everywhere finally get their revenge You control a little preppie who, for some reason, has been sent to retrieve golf balls from the middle of hazards such as you will never see at your local municipal course The road and river that have to be crossed are naturally filled with various speeding objects ready to squash drown or eat you if you mis-step

In the lower levels manic little men are intent upon rolling the road, and these can squash you very graphically, to the accompaniment of a Funeral March Later levels present you with speeding golf carts bulldozers snapping alligators and the Froggy Revenge a giant frog which will jump on you given half the chance The music (guaranteed to drive you crazy



Tony Bridge trawling the depths

within about half a minute) sounds and incredible graphics of this program make it entirely addictive

Finally after all the preceding intellectual stimulation a good old no-nonsense, Arcade Game *Caverns of Mars* from Atari Program Exchange (APX) This turns out to be a vertical version of Scrambler and apparently has been a firm favourite of Atarists for some months At each of the four skill levels your ship has to negotiate ever more airlocks, and zap more little nasties (boy are they difficult to shoot!) until the re-energising base can be reached A time limit is then set, in which you have to renegotiate all the airlocks and escape

Summary

These final three games highlight, at the same time, the similarities and the differences between Thorn/EMI s new collection, and those of the smaller software producers

The main similarity is excellent graphics In fact, it would be hard to program poor graphics on an Atari and it is this feature, above all others which persuades people to part with larger sums of money than for other computers (the gap between the graphics of the Atari and those of its lower-priced competitors is however narrowing all the time)

The outstanding difference between the Thorn/EMI catalogue and the others reviewed here is *addictiveness* Not one of T/E s games including the excellent *Submarine Commander* has this quality while the three last games all have it in spades (I am going to defeat this game — just one more go)

At the prices charged universally for Atari software games *must* stand up to being played time and again Unfortunately the value marks for *all* the programs suffer from the high cost involved I cannot believe that it is necessary to charge an average of £20 for what are mostly very pedestrian programs *Jumbo Jet Pilot* at £30 is outrageously over-priced — a similar program from Psion/Sinclair for the Spectrum is just about as good and costs a mere £8 "A smaller market," I hear you say? Well yes, but until Atari bring down the price of their hardware, the market will remain smaller ■

Firm	Program	Cassette or Cartridge	Cost	Value (1-10)
Thorn/EMI	*Cribbage & Dominoes*	Cassette	£14.95*	7
	Snooker & Billiards	Cassette	£16.95*	6
	Pool	Cassette	£19.99*	6
	Kickback	Cartridge	£29.99*	4
	Submarine Commander	Cartridge	£24.50*	7
	Jumbo Jet Pilot	Cartridge	£29.95*	3
	Figure Fun	Cassette	£14.99*	6
	Compute 4 & Reversi	Cassette	£14.99*	4
	Owari & Bull and Cow	Cassette	£14.99*	4
Atari (APX)	*Caverns of Mars*	Cassette	£24.50	8
Adventure Int	*Preppie*	Cassette	£29.00	8
Synapse Software	*Shamus*	Cassette	£21.80	8

*Prices can vary depending on the retailer

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Atari 800 with 48K RAM (AF55K) £480 00

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Other hardware		
Cassette Recorder	(AF28F)	£50 00
Disk Drive	(AF06G)	£2[illegible] 95
Thermal Printer	(AF04E)	£265 00
Epson MX80T Mk III	(AF36R)	£398 55
Epson MX80F T Mk III	(AF40T)	£447 35
Printer Interface for 400	(AF41U)	£[illegible] 55
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An independent users' group. Four issues of the club magazine for only £3.00! Address your subscription to Ron [illegible] issue 1 of the club magazine featured a tutorial on character set redefinition and contained a collection of demonstration and games programs and lots more. Issue 2 featured a tutorial on player/missile graphics, an article about graphics on computers, a selection of members' contributions to the program library and much more

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Display Lists	[illegible]	[illegible]
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Stick Subroutines	[illegible]	[illegible]
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Business Programs		
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The Battle Of Shiloh	[illegible]	[illegible]
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OPEN FORUM

Open Forum is for you to publish your programs and ideas Take care that the listings you send in are all bug-free Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed We will pay the _Program of the Week_ double our new fee of £6 for each program published

Grand Prix

on Vic 20

This is a simple game to play and is basically a race against time Don't be put off by that, because although it is a fairly basic game there is still room for expansion

The game involves controlling a character anti clockwise around a set track (the character can be changed by changing the poke values in lines 260 330 390 and 800) If you hit a wall you are sent back to the beginning of the lap There are also hidden oil slicks on the track and these also cause you to spin and crash

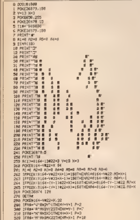
The whole course is three laps long The program fits into the 3 5K which is available on the unexpanded Vic The program also makes use of the Vic's auto-repeat function which is not widely known about

The problem of how to get the computer to recognise whether the car has crashed or not was solved by making it check the 4 characters around the car and if any of them is part of the wall its location is stored for later reference

Once the operator has moved the car its present location is compared with those stored previously and if they match up the car has crashed because it is now in the same position as part of the wall The program takes full advantage of the sound and colour facilities available on the Vic

Program notes

Line(s)	
1 to 8	Set counters and variables
10 to 250	Draw the track
259 to 260	Draw the car on the screen
261 to 265	Check the area around the car for walls
268 to 358	Check keyboard for keys being pressed and set volume
390 to 405	Check if the car has crossed the finish line and if it has print the number of laps completed
505 to 530	Make explosion sound
640 to 750	If three laps have been completed make the sound to tell the operator and print the time taken to complete the course
800 to 820	Refill the holes in the wall
1000 to 1140	Print the instructions to the player



```
0 GOSUB1000
1 POKE36879,190
2 Y=13 X=3
3 POKE650,255
4 POKE36878 15
5 TI$="000000"
6 POKE36879,190
7 PRINT"
8 A1=0 A2=0 A5=0 A4=0
9 DIMA(10)
10 PRINT"
12 PRINT"
20 PRINT"
30 PRINT"
31 PRINT"
40 PRINT"
50 PRINT"
60 PRINT"
70 PRINT"
80 PRINT"
90 PRINT"
100 PRINT"
110 PRINT"
120 PRINT"
130 PRINT"
140 PRINT"
150 PRINT"
160 PRINT"
180 PRINT"
190 PRINT"
200 PRINT"
210 PRINT"
220 PRINT"
230 PRINT"
241 POKE36878 5
250 PRINT"
259 A(I)=8164-13*22+3 Y=13 X=3
260 POKE8164-Y*22+X 54
261 A1=0 A2=0 A3=0 A4=0 A5=0 A6=0 A7=0 A8=0
262 IFPEEK(8164-Y*22+X+1)=160THENA1=8164-Y*22 A5=X+1
263 IFPEEK(8164-Y*33+X-1)=160THENA2=8164-Y*22 A6=X-1
264 IFPEEK(8164-(Y-1)*22+X)=160THENA3=8164-(Y-1)*22 A7=X
265 IFPEEK(8164-(Y+1)*22+X)=160THENA4=8164-(Y+1)*22 A8=X
268 POKE36874 128
270 GETA$
280 POKE8164-Y*22+X,32
290 IFA$="Q"ANDY>1THENY=Y+1 P=2
300 IFA$="A"ANDY<23THENY=Y-1 P=7
310 IFA$="N"ANDX>1THENX=X-1 P=3
320 IFA$="M"ANDX<22THENX=X+1 P=10
321 POKE36878,P
330 POKE8164-Y*22+X 54
340 IFA1=8164-Y*22ANDA5=XTHEN500
345 IFA2=8164-Y*22ANDA6=XTHEN500
350 IFA3=8164-Y*22ANDA7=XTHEN500
355 IFA4=8164-Y*22ANDA8=XTHEN500
356 IFY=4ANDX=20THEN500
360 FORT=2TO5
390 IFPEEK(8164-16*22+T)=94THENLP=LP+1 IFLP=3THEN 560
400 NEXT
405 PRINT"LAPS="LP
410 GOTO260
500 FORT=10TO15
501 FORO=10TO12
502 IFY=OANDX=TTHEN260
503 NEXT NEXT
504 IFY=9ANDX=2THEN260 IFY=9ANDX=4THEN260
505 POKE36877,220 FORU=15TO1STEP-1
506 POKE8164-Y*22+X,42
510 POKE36878,U
520 FORI=1TO50 NEXT
530 NEXT
540 POKE36877,0
590 GOTO800
640 POKE36878,15
650 Q=Q+1 IFQ>10THEN700
655 POKE36876,220
660 FORT=1TO50
665 NEXT
668 POKE36876,0
670 GOTO650
700 PRINT"   YOU HAVE COMPLETED 3 LAPS IN A TIME
    OF   POKE36874,0 Q=0
710 PRINT
720 PRINT"H /M/S
730 PRINTTI$
740 FORW=1TO5000 NEXT
750 CLR GOTO1
800 POKEA(1),94
810 POKEA1 160 POKEA2 160 POKEA3,160 POKEA4,160
815 POKE8164-Y*22+X 160
820 GOTO259
1000 PRINT "************************
1010 PRINT    GRAND  PRIX
1020 PRINT
1030 PRINT " IN THIS GAME YOU ARE  THE DRIVER OF
     A        FORMULA 1 RACING CAR"
1040 PRINT   TO CONTROL YOUR CAR  USE "
1050 PRINT"  Q TO MOVE UP"
1060 PRINT   A TO MOVE DOWN"
1070 PRINT"  N TO MOVE LEFT"
1080 PRINT"  M TO MOVE RIGHT"
1090 PRINT  HIT ANY KEY
1091 PRINT "WATCH OUT FOR OIL ON  THE ROAD IT IS
     DEADLY.
1095 PRINT"************************"
1100 GETC$ IFC$=""THEN1100
1110 PRINT"
1120 PRINT" YOU HAVE TO COMPLETE  3 LAPS OF THE
     COURSE  AS FAST AS POS.
1130 FORT=1TO3000 NEXT
1140 RETURN
```

Grand Prix
by Brandon James

Spikey

on Vic 20

This program is written for a Vic20 with a Super Expander fitted. It uses the *Draw* command to its fullest potential. When the program is run the title page is shown for a few seconds and then a choice of three kinds of spikes, ranging from fine spikes to course spikes are shown. The user then chooses the required spike width.

The user then inputs the number of spikes which is going to be displayed. The spikes will then be displayed with a small delay between each spike. After all the spikes have been displayed the program is re-run.

Program notes

Line 5 freeze to upper case. Gosub subroutine 270 (setting up program). *For Next* loop for drawing certain numbers of spikes.
Line 20 setting up random number, setting up random width between spikes.
Lines 30-230 drawing spikes from top left-hand corner going clockwise around the screen.
Line 240 delay loop.
Line 250 Clears the screen.
Line 260 end of loop, re-run the program.
Lines 270-320 display title page, delay loop.
Lines 330-400 choosing gap between each spike.
Lines 400-410 choose how many spikes to be shown.

```
0 REM    SPIKEY
1 REM(C) R.HAYNES 1982
5 PRINTCHR$(8) GOSUB270 FORRI=0TOS
10 GRAPHIC3
20 N=1+INT(RND(1)*14) W=P+INT(RND(1)*RN)
30 COLOR0,0,N,N
40 T=0
50 DRAWN,T,0TO511.5,511.5
60 T=T+W
70 IFT>=1023THEN90
80 GOTO50
90 T=0
100 DRAWN,1023,TTO511.5,511.5
110 T=T+W
120 IFT=>1023THEN140
130 GOTO100
140 T=1023
150 DRAWN,T,1023TO511.5,511.5
160 T=T-W
170 IFT<=0THEN190
180 GOTO150
190 T=1023
200 DRAWN,0,TTO511.5,511.5
210 T=T-W
220 IFT<=0THEN240
230 GOTO200
240 FORDE=1TO3000 NEXT
250 SCNCLR
260 NEXT RUN
270 GRAPHIC0
280 PRINT"[illegible]" POKE36079,10
290 R$="        SPIKEY         [illegible]  (C)R.
    HAYNES 1982   [illegible]     THORPE BAY
       "
300 B$="   ESSEX.":R$=R$+B$
310 FORT=1TOLEN(R$) PRINTMID$(R$,T,1),
    FORI=0TO65 NEXTI,T
320 FORDE=1TO5000 NEXT
330 PRINT"[illegible]"
340 R$="1 FINE SPIKES[illegible]2 MEDIUM
    SPIKES[illegible]3 COURSE SPIKES[illegible]
    [illegible]INPUT CHOICE"
350 FORI=1TOLEN(R$) PRINTMID$(R$,I,1),
     FORT=0TO65 NEXTT,I
360 INPUTA
370 IFA=1THENRN=25 P=5
380 IFA=2THENRN=200 P=30
390 IFA=3THENRN=1023 P=205
400 IFA<1ORA>3THEN330
410 FORI=1TO38 PRINTMID$("[illegible]INPUT NUMBER
    OF SPIKES[illegible]TO BE SHOWN",I,1),
     FORT=0TO6 5 NEXTT
420 NEXTI
430 INPUTS
440 RETURN
```

Spikey
by Robin Hayes

Defender

on Spectrum

This is a version of the popular arcade game. You must shoot down the oncoming alien, because if he passes you, you are obliterated. Sounds easy? You only have 20 shots per 10 aliens! If you accomplish this then you have an extra 20 shots.

Line 55 is a graphic A, 310 is graphic B and C and 420 is graphic D and E. The program is very fast for Basic, eg, the landscape movement and the firing rate.

When you are killed, press *Break* and then press R (*Run*) and *Enter*. My highest score is 14.

```
1 FOR f=0 TO 7: POKE USR "b"+f,RND*255: POKE USR "c"+f,RND*255:
NEXT f
2 LET i=0: LET bl=20
3 LET s=0: LET a=0
6 FOR f=0 TO 7: READ a: POKE USR a+f,a: NEXT f: DATA [illegible]
[illegible]
7 FOR f=0 TO 7: READ x,y: POKE USR x+f,y: POKE USR "e"+f,y:
NEXT f: DATA 24,7,28,274,64,192,85,128,65,128,64,128,32,1?4,34,
5
8 LET b$="------------------------
-------------": LET c$=
9 LET f=0: LET x=10
10 LET a$=[illegible]
20 [illegible]
25 GO TO 45
30 PRINT INK 2;AT 20,0;a$
40 LET a$=a$+a$(1): LET a$=a$(
2 TO )
43 RETURN
45 GO SUB 30
46 GO SUB 49: IF i<>0 THEN GO
SUB 410
47 IF i=0 THEN GO SUB 400
48 GO TO 45
49 PRINT AT x,0;" "
50 LET x=x+(INKEY$="a" AND x<1
9)-(INKEY$="q" AND x>1)
55 PRINT AT x,0;"A"
57 IF f<>0 THEN RETURN
58 IF INKEY$=" " THEN GO TO 70
0
70 RETURN
300 FOR v=1 TO 20
310 PRINT AT a,v; FLASH 1;"BC"
320 GO SUB 49: GO SUB 30: NEXT
v
330 PRINT AT a,i-1;"   ": LET
i=0: LET s=s+1: PRINT AT 0,0;s
: IF INT (s/10)*10=s THEN LET bl=
bl+20
340 PRINT AT 0,18;bl;"   ": LET f
=0: RETURN
400 LET a=RND*18+1: LET i=28: L
ET a=INT a
410 PRINT AT a,i;"  ": LET i=i-
1: IF i=0 THEN GO TO 500
415 LET a=a-1: IF RND<.5 THEN L
ET a=a+2
417 IF a<1 THEN LET a=1
418 IF a>19 THEN LET a=19
420 PRINT AT a,i;"DE": RETURN
500 PRINT AT x,0;"**"; FLASH 1
;AT 10,10;"INVADED  SCORE=";s: AT
a,i; FLASH 1;"**"
510 GO SUB 30: GO TO 510
700 LET bl=bl-1: IF bl=-1 THEN
GO TO 800
701 PRINT AT 0,18;bl;"  ": IF a=
x THEN GO TO 750
710 PRINT AT x,1;"------------
-----------------": PRINT AT x,
1;"
    RETURN
750 PRINT AT x,1;b$( TO i)
751 FOR v=1 TO 3: NEXT v
752 PRINT AT x,1;c$( TO i)
760 LET g=x: LET f=1: GO TO 300
800 PRINT FLASH 1;AT 10,10;"no
bullets left": GO TO 510
```

Defender
by Nick Wilson

Tips

on ZX81

Hobbyists, on purchasing the ZX81 will have found its slow Basic and lack of facilities very limiting The former can only be overcome by using machine code, but for those content with Basic, here are a few programming tips for use in longer programs

1 The first of these is similar to the Spectrum s *Attr* or *Screen$* It is a way of addressing any square on the screen

The system variable D-FILE contains two bytes showing where the memory mapped screen starts (it moves around the memory) So by *Peeking* D FILE and adding the displacement of the required position it is possible in effect to read data from the screen This is how it is done

```
IF PEEK ((PEEK 16396 * 256 + 1 + PEEK 16397) + 33 * line + position) = CHR$ code THEN
```

If you want to use this a lot in a program then set a variable at the start

```
LET DFS = (PEEK 16396 + 256 * PEEK 16397) + 1
```

Then to use it just type

```
IF PEEK (DFS + 33 * line + position) = CHR$ code THEN
```

On a ZX81 with less than 3 5K this does not work since any line without a character on it is not memory mapped

2 Passing variables to subroutines Imagine you are writing a game in which the player moves around the screen chased by two or more monsters To move the monsters you need two or more almost identical subroutines, which could well be something like 30 lines long — that means 60 lines at least Instead of doing that, you could use this technique Here the variables M11 and M12 are the co-ordinates of the first monster and the variables M21 ahd M22 are the co-ordinates of the second

```
LET M1 = M11
LET M2 = M12
GOSUB routine
LET M11 = M1
LET M12 = M2
•
•
•
LET M1 = M21
LET M2 = M22
GOSUB routine
LET M21 = M1
LET M22 = M2
```

The routine can alter M1 and M2 as necessary The new values are always assigned to the correct variables

3 In a program you may want to use the bottom two lines of the screen To do this, at the start use this statement, which makes the bottom two lines available for *Printing*

```
POKE 16418 0
```

Beware of *Input* which clears the bottom two lines, report codes which over write the first few positions of line 24 and *Scroll* which crashes the system

4 The effect of *Run* is to go through the program in the computer and clear out all the variables Hence when programming a game with a "high score" feature it is necessary either to use GOTO 1 or to employ a *Goto* instead of a *Stop* at the end of the program

Here is another way The very first line of the program should be

```
REM space
```

This saves one byte of data to hold a score of up to 255 Here is how to change the byte for a "high score" (the score is S)

```
IF S > PEEK 16514 THEN POKE 16514 S
```

To print it

```
PRINT PEEK 16514
```

This makes a safe "high score which is proof against RUN and even against *Clear* If you *List* the program you will find another character in the place of the space Look it up in the Sinclair

To have a high score of more than 255 is a little harder The REM statement should contain two spaces To use it

```
9900 IF S < PEEK 16514 * 256 - PEEK 16515
     THEN GOTO 9930
9910 POKE 16514 INT (S/256)
9920 POKE 16515 S - 256 * (INT (S/256))
9930 PRINT HIGH SCORE PEEK 16514 * 256 -
     PEEK 16515
```

Again, this has its limits if the score is over 65535

by Michael Brookes

Graphics utility

on BBC Micro

One of the strong points of BBC Basic is the facility to define procedures which take all the work out of routine operations and add polish to the most mundane programs I have put together a package of the most often used procedures which should be particularly handy for anyone producing output in the form of graphs

A full explanation of the program is contained in *Rem* statements which can be deleted if required and I have included a short program which uses most of the procedures as an example The digitised procedure can be used to plot points and draw simple figures

PROGRAM OF THE WEEK

```
100 REM  **********************
110 REM  **  Simple Example  **
120 REM  **********************
130 MODE4:PROCinit
140 PROCshow(50,1200,50,950)
150 PROCscale(-4*PI,4*PI,-1.5,1.5)
160 PROCaxes(0,0,PI/4,0.25,4,4,.025,PI/16)
170 PROCframe:PRINTTAB(0,31)"y=x*SIN(x)/360 (x= -360 to
    360 degrees)")
180 PROClabel(0,1.05," 1"):PROClabel(0,-.95," -1"):
    PROCmove(0,0)
190 FOR angle=-PI*4 TO PI*4+.1 STEP PI/16
200   PROCdraw(angle,angle/PI/4*SIN(angle))
210   NEXT angle
220 PROCdigitize(0,0,cross)
```

1

-1

y=x*SIN(x)/360 (x= -360 to 360 degrees)

Turn to page 20

```
30000 REM  **************************
30001 REM  **  Graphic Subroutines **
30002 REM  **  David Elliot   1982 **
30003 REM  **************************
30004 :
30005 :
30006 REM     Explanation of Commands:
30007 REM
30008 REM PROCinit                          Initialise Graphics
30009 REM PROCdraw(X,Y)                     Draw line to X,Y
30010 REM PROCset(X,Y)                      Set point at X,Y
30011 REM PROCmove(X,Y)                     Move to X,Y
30012 REM PROCshow(Xmin,Xmax,Ymin,Ymax)     Define graphics window using standard
30013 REM                                   Graphics co-ordinates (1280,1024)
30014 REM PROCscale(Xmin,Xmax,Ymin,Ymax)    Changes the X and Y scaling to fit the
30015 REM                                   Previously defined graphics window
30016 REM PROCframe                         Draws a frame around the graphics
30017 REM                                   window
30018 REM
30019 REM PROCaxes(intX,intY,spaceX,spaceY,majorX,majorY,xsize,ysize)
30020 REM    Draws a pair of axes on the Graphic screen crossing at (intX,intY)
30021 REM    with ticks along the X and Y axes every 'spaceX' and 'spaceY'
30022 REM    respectively.


30023 REM    Every 'majorX' and 'majorY' interval it draws a tick twice the size
30024 REM    The size of the tick is defined by 'xsize' and 'ysize' for the
30025 REM    X and Y axes respectively.
30026 REM    Note: If 0 is specified for spaceX or spaceY the respective ticks
30027 REM    are not drawn.
30028 REM
30029 REM PROClabel(X,Y,A$)                 Prints out label 'A$' at X,Y.
30030 REM PROCdigitize(X,Y,type)            Displays a crosshair at X,Y and allows
30031 REM                                   the user to move it around using the
30032 REM                                   cursor keys until <RETURN> is pressed.
30033 REM                                   The co-ordinates of the point are
30034 REM                                   returned by the 'cursorx' and 'cursory'
30035 REM                                   variables.
30036 REM                                   The cursor type can be either be
30037 REM                                   'fullscreen' or 'cross'
30038 REM                                   E.G. PROCdigitize(0,0,cross)
```

```
30039 REM  End of explanation
30040 REM  **  Start of the real progrma
      **
30041 REM Functions for internal use
30042 DEF FNpointx(x)=x*scalex
30043 DEF FNpointy(y)=y*scaley
30044 :
30045 REM   ** Initialise Graphics **
30046 :
30047 DEF PROCinit
30048 VDU 20,26,29,0;0;0;0;0;
30049 scalex=1:REM Set screen to normal
30050 scaley=1
30051 cursorx=0:REM move cursor to 0,0
30052 cursory=0
30053 minx=0:maxx=1279:miny=0:maxy=1023
30054 fullscreen=TRUE:cross=FALSE
30055 ENDPROC
30056 :
30057 REM  ** Draw Line **
30058 :
30059 DEF PROCdraw(X,Y)
30060 DRAW FNpointx(X),FNpointy(Y)
30061 ENDPROC
30062 :
30063 REM  ** Draw point **
30064 :
30065 DEF PROCset(X,Y)
30066 PLOT 69,FNpointx(X),FNpointy(Y)
30067 ENDPROC
30068 :
30069 REM  ** Move to a point **
30070 :
30071 DEF PROCmove(X,Y)
30072 MOVE FNpointx(X),FNpointy(Y)
30073 ENDPROC
30074 :
30075 REM  ** Define graphics window **
30076 REM     using standard (1280,1024)
30077 REM     co-ordinates
30078 :
30079 DEF PROCshow(minX,maxX,minY,maxY)
30080 REM Define window
30081 VDU 24,minX;minY;maxX;maxY;0;0;0;
30082 REM Store screen limits
30083 minx=minX:miny=minY
30084 maxx=maxX:maxy=maxY
30085 ENDPROC
30086 :
30087 REM  ** Define scale **
30088 :
30089 DEF PROCscale(minX,maxX,minY,maxY)
30090 LOCAL A,B,C,D
30091 REM work out conversion scale
30092 A=(maxx-minx)/(maxX-minX)
30093 B=(maxy-miny)/(maxY-minY)
30094 REM Redefine graphics origin
30095 VDU 29,minx-(A*minX);miny-(B*minY)
      ;0;0;0;
```

```
30096 scalex=A
30097 scaley=B
30098 REM set screen limits
30099 minx=minX:miny=minY
30100 maxx=maxX:maxy=maxY
30101 ENDPROC
30102 :
30103 REM ** Draw frame around screen **
30104 :
30105 DEF PROCframe
30106 PROCmove(minx,miny):PROCdraw(maxx,
      miny)
30107 PROCdraw(maxx,maxy):PROCdraw(minx,
      maxy)
30108 PROCdraw(minx,miny)
30109 ENDPROC
30110 :
30111 REM  ** Draw axes **
30112 :
30113 DEF PROCaxes(intX,intY,spaceX,
      spaceY,majorX,majorY,xsi
30114 LOCAL A,B%,C,D
30115 REM Draw axes
30116 PROCmove(minx,intY)
30117 PROCdraw(maxx,intY)
30118 PROCmove(intX,miny)
30119 PROCdraw(intX,maxy)
30120 REM  Draw Horizontal ticks
30121 IF spaceX=0 THEN 30135
30122 B%=0
30123 FOR A=intX TO maxx STEP spaceX
30124   IF (B% MOD majorX)=0 THEN
        C=xsize*2 ELSE C=xsize
30125   PROCmove(A,intY-C)
30126   PROCdraw(A,intY+C)
30127   B%=B%+1
30128   NEXT A
30129 B%=0
30130 FOR A=intX TO minx STEP
      -spaceX
30131   IF (B% MOD majorX)=0 THEN
        C=xsize*2 ELSE C=xsize
30132   PROCmove(A,intY-C):PROCdraw
        (A,intY+C)
30133   B%=B%+1
30134   NEXT A
30135 :
30136 REM  Draw Vertical ticks
30137 IF spaceY=0 THEN 30148
30138 B%=0
30139 FOR A=intY TO maxy STEP spaceY
30140   IF (B% MOD majorY)=0 THEN
        C=ysize*2 ELSE C=ysize
30141   PROCmove(intX-C,A):PROCdraw
        (intX+C,A)
30142   B%=B%+1:NEXT A
30143 B%=0:FOR A=intY TO miny STEP
        -spaceY
30144   IF (B% MOD majorY)=0 TNEN
        C=ysize*2 ELSE C=ysize
30145   PROCmove(intX-C,A):PROCdraw
        (intX+C,A)
30146   B%=B%+1
30147   NEXT A
30148 ENDPROC
30149 :
30150 REM  ** Print label **
30151 :
30152 DEF PROClabel(X,Y,A$)
30153 REM Move to graphics point
30154 MOVE FNpointx(X),FNpointy(Y)
30155 REM Join cursors and print label
30156 VDU 5
30157 PRINT A$;
30158 VDU 4
30159 ENDPROC
30160 :
30161 REM  ** Digitize point **
30162 :
30163 DEF PROCdigitize(X,Y,type)
30164 LOCAL X%,Y%,ix%,iy%
30165 cursorx=X:cursory=Y
30166 REM Get co-ord of cursor
30167 X%=FNpointx(X)
30168 Y%=FNpointy(Y)
30169 ix%=4:iy%=4
30170 GCOL 3,127
30171 PROCdrawcursor(X%,Y%,type)
30172 REM Switch of cursor keys
30173 *FX 4 1
30174 A=GET
30175 IF A=13 THEN 30185
30176 IF A<&88 OR A>&8B THEN 30174
30177 REM Move cursor
30178 PROCdrawcursor(X%,Y%,type)
30179 IF A=&88 THEN X%=X%-ix%
30180 IF A=&89 THEN X%=X%+ix%
30181 IF A=&8A THEN Y%=Y%-iy%
30182 IF A=&8B THEN Y%=Y%+iy%
30183 GOTO 30171
30184 REM reset cursor co-ordinates
30185 cursorx=X%/scalex
30186 cursory=Y%/scaley
30187 PROCdrawcursor(X%,Y%,type)
30188 ENDPROC
30189 :
30190 REM ** Draw cursor **
30191 REM For internal use
30192 :
30193 DEF PROCdrawcursor(X%,Y%,type)
30194 IF type=cross THEN MOVE X%-20,Y%:
DRAW X%+20,Y%:MOVE X%,Y%-20:DRAW X%,Y%+20
 ELSE MOVE FNpointx(minx),Y%:DRAW
FNpointx(maxx),Y%:MOVE X%,FNpointy(miny)
:DRAW
X%,FNpointy(maxy)
30195 ENDPROC
```

Graphics Utility
by David Elliot

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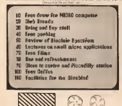
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Automatic loading

***John Ingham** presents an index routine to sort through different programs on one tape.*

This tape index program is a fully automatic, electronic digital counter for the Vic20. It allows for the selection, automatic loading and running of your other programs.

Enter the index program in your Vic and change the data lines from 340 to 450 to the program names which you wish to save. Then save this program at the beginning of a C60 tape cassette.

To save each of the programs you wish to put on the C60 tape cassette take the following steps:

1) Load and run the index program off the C60 tape cassette
2) Select the program you wish to save on the C60 tape cassette — the computer will use the fast forward to find the correct position on the C60 cassette
3) When the computer asks you to "Press play on tape", press the stop key and clear the screen
4) Remove the now set C60 tape cassette from the tape unit
5) Insert your selected program in the unit
6) And fully rewind the tape to its beginning
7) Type the word 'Load' on the screen and press 'Return' key
8) When the program has loaded, remove the tape cassette
9) Insert the previously set C60 in the tape housing right way up
10) Type the words 'Save' your program name' then press 'Return' key
11) Your program has now been saved on the C60 cassette
12) To 'Verify' the program take steps 1-9 then type verify and 'return' key

To load a program using tape index, just follow program instructions.

To compensate for different tape units, measure the fast forward time from beginning to end using a C60 cassette. Then enter it in line 160 — FFT=time in seconds.

Always use good quality cassette tapes. I use Sony CHF60.

Variables description
FFT - WINDING TIME
PC = REWIND DIVIDED BY PLAY TIME
A = CASSETTE MOTOR ON & OFF
FT = PROGRAM INDEX
TI = VIC CLOCK COUNT UP
B = KEYBOARD BUFFER
D = SCREEN LINE FOR CURSOR
L$ = STRING OF SPACES
A$(?) - A—N CODES
A$(B) = PROGRAM NAMES
BS = 8k EXPANDED CHUNKS ON C60
TI$ — 24 HOUR CLOCK
C = CHARACTER BUFFER

```
100 REM**************
110 REM* TAPE INDEX*
120 REM*   PROGRAM *
130 REM* FOR VIC 20*
140 REM*BY J.INGHAM*
150 REM**************
160 FFT=90 REM C60 WINDING TIME SEC
170 PC=5.073E-2 REM REWIND/PLAY TIME
180 POKE37148,52 A=37151 B=631 C=198 D=211
190 PRINT"@@@@" DIM A$(12),B$(12) L$="#"
200 FORI=0TO30 L$=L$+CHR$(32) NEXT L$=L$+"#"
210 FORI=65TO76 READ B$(I-65) IF LEN(B$(
    I-65))>16 THEN 230
220 A$(I-65)=CHR$(I) GOTO 270
230 PRINT"@STRING TOO LONG@" PRINT"IN
    'DATA' LINES"
240 PRINT"COUNT THE CHARACTORS"
250 PRINT"OF DATA LINES 340-450"
260 LIST340-450
270 NEXT GOSUB 600
280 PRINT"#SELECT APROPRIATE CODE FOR
290 PRINT"POSITION ON TAPE  ? ",
300 POKE C,0
310 GETA$ IFA$=""THEN310
320 IFA$<"A"ORA$>"L"THEN300
330 BS=ASC(A$)-64 PRINT A$ B$=B$(ASC(A$)-65)
    A$="LOAD"
340 DATA PROGRAM  1
350 DATA PROGRAM  2
360 DATA PROGRAM  3
370 DATA PROGRAM  4
380 DATA PROGRAM  5
390 DATA PROGRAM  6
400 DATA PROGRAM  7
410 DATA PROGRAM  8
420 DATA PROGRAM  9
430 DATA PROGRAM 10
440 DATA PROGRAM 11
450 DATA PROGRAM 12
460 PRINT"#YOU ARE GOING TO "A$," ",B$
470 PRINT"#IS IT CORRECT ? ",
480 POKE C,0
490 GETD$ IFD$=""THEN490
500 IFD$="N"THEN RUN
510 IFD$<>"Y"THEN480
520 GOSUB750
530 PRINT"@PRESS REW ON TAPE"
540 IFPEEK(37151)<>62GOTO540
550 FORI=1TO600 NEXT
560 PRINT"#PRESS STOP ON TAPE"
570 PRINT"#@WHEN FULLY REWOUND.
580 IFPEEK(37151)<>126GOTO580
590 GOSUB750 PRINT"@@@@" GOSUB600 GOSUB620
    GOSUB660
600 FORI=0TO11 PRINT"#@" A$(I),"= #*",B$(I)
    NEXT
610 RETURN
620 TI$="000000" BS=BS*8000
630 FT=.1153E1+.13985E-2*BS-.71234E-8*BS↑2+.
    24540E-13*BS↑3-3.5562
640 FT=FT*FFT/90*13.7134*PC
650 RETURN
660 PRINT"#PRESS F.FWD ON TAPE"
670 IFPEEK(37151)<>62GOTO670
680 PRINTL$
690 PRINT"#FAST WINDING TO "B$
700 TI$="000000" FT=TI+FT*60
710 PRINT"#@@"INT(TI/10),INT(FT/10)
720 IFTI<FTGOTO710
730 POKE A,52 POKE37148,6
740 GOSUB750 GOTO790
750 PRINT"@PRESS STOP ON TAPE"
760 IFPEEK(A)<>126GOTO760
770 POKEA-3,12
780 RETURN
790 PRINT"@" POKE D,11 PRINT PRINT
    "@@@@@@@@@@@@RUN"
800 PRINT"#@@@",A$,
810 PRINT,CHR$(34),B$,CHR$(34)"@@@"
820 POKE B,12 POKE C,5 POKE B+1,13 POKEB+2,
    13 POKEB+3,13 POKEB+4,13

READY.
```

Stringing up for time

In part four of our extract from The Working Spectrum *we continue adding modules/subroutines to the Unifile program, designed to enable a single program to cover a variety of filing tasks without the need for constant re-writing every time a new use comes along*

MODULE 5

This module is the most complex in the program. Before proceeding to a detailed commentary we shall discuss two issues

1 The use of strings to store numbers
2 The technique of the binary search

Numbers in Strings

We have already seen in Module 3 that the pointers for our program are stored in a string, Y$. You may be wondering why numeric values are not being stored in a straightforward numeric array. The answer stems from both memory saving and time saving, the latter being the more significant. Let's look at memory saving first.

To cope with the maximum number of entries that are likely to be encountered, a numeric array for the pointers would have to be declared with something like 2,000 elements. It is most unlikely that you will actually have 2,000 entries but you might. You would have serious problems if your array turned out to have too few spaces for the number of entries that have to be pointed to. An array cannot be re-dimensioned without losing everything in it. The real problem is that a 2 000 element numeric array, because of the way in which Sinclair Basic stores numbers, would occupy some 10,000 bytes of memory. This is an extravagent proportion of the total memory available.

The Spectrum allocates five bytes of memory to every number stored in an array, in an effort to cover as wide a range of numbers as possible — up to 4 294 967 295 in fact. We do not need anything like that range: our file is only 26 000 characters long so we only need whole numbers from 1 to 28 000. Using two character strings it is possible to represent these numbers.

Each character has a code value unique to it, in the range 0 to 255. A single character can be used to store any value between 0 and 255 simply by using the character that has that code. Thus the character A represents the number 65 and the keyword GOTO — just another character as far as the Spectrum is concerned — represents the number 236. Numbers larger than 255 are simply represented by using a second character to store the number of whole 256s, in much the same way that the 3 in 36 means three whole tens in our decimal system. Two characters therefore give us the ability to store any positive whole number up to 256 * 256 + 255. That equals 65,535 and is more than enough to copy with our file of 28 000 characters.

Provided you only want positive whole numbers in the range 0 to 65 535 it is possible to save three of the five bytes that the Spectrum would use if the same numbers were stored in a numeric array.

The catch is that two of the three bytes saved are then thrown away in the search for speed.

Imagine again our numeric array of 2 000 elements and imagine you want to add or delete a number somewhere near the beginning of it. If you simply delete an unwanted value you leave a hole, or rather a zero, in the place where the number once was. If you insert a number you will overwrite what is already there. To avoid either of these unwanted results you have to ensure that every element in the array can be shifted up or down one place. If the position in which you want to insert a new number is position 1, then 1,999 numbers are going to have to be shifted to make room. It can be done with three lines of Basic in the form of a simple loop but it does take time, especially on a Spectrum. Not even its best friends describe the Spectrum as blindingly fast.

Now compare that loop, repeating its operation 1 999 times with this

```
LET A$ = XX + A$
```

Using the Spectrum's superb string handling we can simply insert two bytes at the beginning, or at the end, or in the middle, of a string with one instruction. This is very fast but it has a drawback — it momentarily doubles the amount of space taken by the string. The Spectrum needs to hold in its memory, even if only for a moment, the new A$ that the line is creating, together with the old A$ that is being used to build it. This limitation is one of the biggest drawbacks to the Spectrum's string handling and it is difficult to avoid. It means that Y$, which is used to store the pairs of characters which we use as pointers to the entries in the main file, is effectively twice as long as it looks since in our search for speed it will momentarily double every time we add to it or delete from it. The doubling may only be momentary, but we must still allow memory space for it. It's a shame, but we have to learn to live with it.

This drawback is the reason we do not use the same method for actually inserting or deleting data in our main file B$. To do so would halve the amount of space that could be used for entries. We have set up B$ as a fixed length array and when we want to delete something, we move the rest of the file down chunk by chunk to fill the gap created.

Binary Searching

We will use the binary search technique to reduce the possible number of comparisons made when finding the correct place to insert a new entry from a possible 12 500 to 15. Consider the following example.

We have established a file which now contains 2 000 items and the current input needs to be inserted at position 1731, although the program has not yet discovered this. The program begins its search by looking at the first entry and comparing it with the new entry to be inserted. The new entry is found to be the greater of the two and so the program moves on to compare it with entry number 2. Eventually after making 1 731 comparisons the program comes across the first entry in the file which is greater than the new entry. It has now found the correct position for the item.

Compare this straightforward procedure with the following for a file of the same size and an insertion in the same position.

The program begins by examining the entry in position 1024, that being the great power of 2 which is less than or equal to the number of entries in the file. The entry at that position is found to be less than the new entry. The program adds 1024/2 to 1024 giving the result 1536. The entry at 1536 is still less than the new entry so 1024/4 is added to 1526 giving 1792. The entry at 1792 is greater than the new entry so 1024/8 is subtracted from 1792 giving 1664. The search proceeds at the following locations in the file with the following additions or subtractions

1664 (then add 64)
1728 (then add 32)
1760 (then subtract 16)
1744 (then subtract 8)
1736 (then subtract 4)
1732 (then subtract 2)
1730 (then add 1)
Final result 1731

The power of a binary search should be apparent.

Commentary on Module 5 continues next week. ■

UNIFILE Module 5

```
1650 REM ************************
1660 REM PLACE DATA IN FILE
1670 REM ************************
1680 IF P+LEN A$-1<LEN B$ THEN G
O TO 1730
1690 PRINT AT 14,10; FILE NOW FU
LL
1700 PRINT "    Press any key t
o continue"
1710 PAUSE 0
1720 RETURN
1730 LET POWER=INT (LN (N-1)/LN
2)
1740 LET S=2↑POWER
1750 LET T$=A$(2 TO CODE A$(1))
1760 FOR K=POWER-1 TO 0 STEP -1
1770 LET D=FN A()
1780 LET U$=FN A$()(2 TO )
1790 LET S=S+(2↑K)*(T$>U$)-(2↑K)
*(T$<U$)
1810 IF S>N-1 THEN LET S=N-1
1820 IF S<0 THEN LET S=0
1830 NEXT K
1840 LET D=FN A()
1850 LET U$=FN A$()(2 TO )
1860 IF T$<U$ THEN LET S=S-1
1870 LET B$(P TO P+LEN A$-1)=A$
1880 LET N=N+1
1890 LET Y$=Y$(1 TO 2*S)+CHR$ IN
T (P/256)+CHR$ (P-256*INT (P/256
))+Y$(2*(S+1)-1 TO )
1900 LET P=P+LEN A$
1910 RETURN
```

RAG on the Dragon

***Dave Windle** teaches his Dragon to produce random art generation*

Having got your computer what do you use it for? How many times has that question been asked? There are always games of course. Or lists of phone numbers of friends whose numbers you know quite well — and even if you do not, its far quicker to get out the family directory, which you probably used to compile the program in the first place. So, what do you use a micro for?

One possibility is RAG (Random Art Generation). Most of the available micros can cope quite easily with this type of program. The following programs are for the Dragon, but with minimal alterations will run on most types of micro.

Colour computers can, in the main, draw pictures using their various graphics capabilities. However, these can be tedious and time consuming. The answer? Random Generation. Simple programs producing perpetual displays. These displays can be a great talking point at parties and are easily as therapeutic as gazing into an aquarium, and a lot more colourful.

Our first program consists of circles of various sizes drawn one over the other ad infinitum. As some of these are painted and others just outlined, the effects can be quite stunning.

In this program line 20 sets mode and colour set. Lines 30 to 60 set random numbers X and Y for co-ordinates R for radius and C for colour. Line 70 draws circle outline and line 80 paints circle (as some of the circles overlap others of the same colour, these usually will not be painted). Line 90 slows things down and line 100 sets the loop.

The same idea is used in the second program. Only this time we use squares and rectangles.

In this program red is the dominant colour and would eventually fill the screen. Therefore line 120 is necessary to clear the screen and send us back to the drawing board.

The next example is, more or less, a combination of the previous two. One of the advantages of this type of program is that they are readily altered. Thus allowing each Electro artist to develop his or her own style.

It is sensible to build a stop device into the programs. Just in case you get a masterpiece on the screen. Then its out with the brushes. After all even Constable only painted what he saw. Try this:

```
line No A$ = INKEY$ IF A$ = "S" THEN n ELSE nn
line no GOTO n
```

(n = number of following line nn = last line of program)

These two lines should be inserted between the penultimate and last line of your program.

The previous three programs have had (like the fish tank) a soothing, therapeutic effect. For an alternative, more mind blowing, result try program four. ■

PROGRAM 1 CIRCLE ART

```
10 REM CIRCLE ART DAVE WINDLE 1982
20 PMODE 3,1 SCREEN 1,0 PCLS
30 X=(RND(255))
40 Y=(RND(191))
50 R=(RND(90))
60 C=(RND(8))
70 CIRCLE(X,Y),R,C
80 PAINT (X,Y),C,C
90 FOR L=1 TO 500 NEXT L
100 GOTO30
```

PROGRAM 2 SQUARE ART

```
10 REM SQUARE ART DAVE WINDLE 1982
20 PMODE 3,1 SCREEN 1,0 PCLS S=0
30 A=(RND(255))
40 B=(RND(191))
50 C=(RND(8))
60 D=(RND(220))
70 E=(RND(160))
80 X=D+5 Y=E+5
90 LINE(A,B)-(D,E),PSET,B
100 PAINT(X,Y) C,4
110 FOR L=1 to 500 NEXT L
120 S=S+1 IF S=25 THEN 10
130 GOTO 30
```

PROGRAM 3 COMBO ART

```
10 REM COMBO ART DAVE WINDLE 1982
20 PMODE 3,1 SCREEN 1,1 PCLS
30 X=(RND(255))
40 A=(RND(255))
50 Y=(RND(191))
60 B=(RND(191))
70 R=(RND(90))
80 D=(RND(120))
80 C=(RND(8))
100 E=(RND(180))
110 CIRCLE(X,Y),R,C
120 LINE(A,B)-(D,E),PSET,B
130 PAINT(X,Y),C,4
140 FOR L=1 TO 500 NEXT L
150 GOTO30
```

PROGRAM 4 FLASH

```
10 REM FLASH DAVE WINDLE 1982
20 PCLS
30 X=(RND(3))
40 PMODE X,1 SCREEN 1,1
50 A=128 B=92
60 C=(RND(250)) D=(RND(172))
70 LINE(A,B)-(C,D),PSET
80 SOUND C,1
90 GOTO 30
```

Executing instructions

Two weeks ago we looked at flags and how they affect conditional jumps. We also examined relative jumps and how they can be used to move 128 bytes backwards or 127 bytes forwards

Suppose the code is to be loaded from 4300 hex

Address		Instruction	Hex code
4300		LD A, 1E	3E 1E
4302	LOOP	CP A (HL)	BE
4303		INC HL	23
4304		JRNZ LOOP	20 FC

Why is *Fc* in the address part of the *Jrnz* instruction? It works like this: when the *Jrnz* instruction is executed the *Pc* is bumped up by 2 because it's a 2-byte instruction. So the *Pc* is now at 4306. We want to jump to *Loop* which is at 4302, 4 bytes back, or −4 bytes away, to use the Z80's way of thinking about it. Now, 4 in binary is 00000100 and we create −4 by flipping the bits and adding 1 (2's complement, remember?). So

```
0 0 0 0 0 1 0 0
                      flip the bits
1 1 1 1 1 0 1 1
              + 1     add 1
---------------
1 1 1 1 1 1 0 0
                      convert to hex
   F   |   C
```

Another thing which may be worrying you: *Inc Hl* does not alter the flags, so it is safe to test after the increment.

The same program with absolute jumps would have looked like

Address		Instruction	Hex code
4300		LD A, 1E	3E 1E
4302	LOOP	CP A, (HL)	BE
4303		INC HL	23
4304		JPNZ LOOP	C202 43

Notice that the *Jpnz* instruction has 3 bytes because it contains a whole 16 bit address — and do not forget about swapping the 2 bytes of that address around!

There is one very powerful instruction in the jump group we have not mentioned yet — *Djnz*. It decrements the *B*-register by 1 and jumps (relative) only if the result is non-zero. Suppose our little "search for 1E" program is only to search a region one hundred (hex 64) bytes long, after which it should leave the loop whether it's found a 1E or not.

```
        LD B, 64        06 40
        LD A, 1E        3E 1E
LOOP    CP A (HL)       BE
        JPZ GOTCHA      CA (address for GOTCHA)
        INC HL          23
        DJNZ LOOP       10 F9
```

The loop is executed 100 times, unless a 1E is found, in which case a branch to *Gotcha* occurs. In other words *Djnz* acts like a simple *For* loop in Basic.

Note that with *all* the relative jump commands *Jr*, *Jrc*, *Jrnc*, *Jrnz*, and *Jrz* the size of jump is calculated the same way.

Adc and Sbc

These are the "*Add* with Carry" and "*Sub* with Carry" instructions. We said earlier that there is a Carry flag in the flags register. This gets set if there is a carry generated out of a register by an arithmetic instruction. The *Adc* instruction will act just like *Add* except that it will add 1 more in if the Carry bit has been set by a previous operation. The *Sbc* instruction works the same way, except that it will subtract the carry flag.

The shift instructions, *Sla*, *Sra* and *Srl* all have the effect of shifting bit-patterns around. *Sla* shifts the pattern left by 1 bit so if the *B* register contains

```
0 0 1 0 1 1 0 0
```

and *Sla b* is executed, the result is

```
0 1 0 1 1 0 0 0
```

(Notice that a zero is used to fill on the right.)

Since 00101100 = 44 and 01011000 = 88 (decimal) you can see that the effect is to multiply by 2.

Another *Sla b* will give

```
1 0 1 1 0 0 0 0
```

Since the senior bit is now one, this will be seen as a negative number and the sign flag will be set. So far as the programmer is concerned, what's happened is that the value (176) cannot be held in a byte — so you have got an overflow condition.

Right shifts work much the same way, but there is one important thing to note. *Srl* fills the senior bit with a zero, but *Sra* fills with whatever was there before. For instance

The reason is this: *Srl* is a *shift right logical* which simply shifts the bit pattern without altering it. *Sra* is a *shift right arithmetic* which treats the operation as "divide by 2". Now, when a negative number is divided by 2 the result should still be negative, so you have to preserve the sign bit.

Push and Pop

You will probably remember these terms from our discussion on stacks. They are used here in exactly the same way, and allow you to access the machine stack other than through a subroutine call.

This can be useful for saving values temporarily. For instance, suppose you've got a value in BC which you want later, but just now you'd like to use BC for something else. You can write

```
PUSH BC

Code
using
BC

POP BC
```

This is often done before a subroutine *Call* as well, so that it does not matter what registers the subroutine uses, it cannot interfere with the calling program's data. You may see code like

```
PUSH BC
PUSH DE         save the registers
PUSH HL
CALL 4FA1
POP HL
POP DE          restore register values
POP BC          (note the order!)
```

assuming that the *A*-register is manipulated by the routine, so you do not need to save it.

Unless you deliberately choose to alter it, the stack pointer *Sp* will be set according to the operating system of the ZX81. There's no harm in leaving it at that value provided you make sure that *Pushes* and *Pops* cancel out in pairs, so that *Sp* returns to its initial value on leaving the machine code routine. Similarly *Calls* and *Rets* have to match (*Usr* generates a *Call*, matched by the final *Ret* that is tacked on to the end by the *Loader* routine).

One feature of the 16-bit operations (*Push*, *Pop*, *Ld* in particular) which is important to grasp is the order in which bytes are transferred from register to memory and vice versa. It's like this:

```
LD (4105) HL
```

will have the following effect if *Hl* contains 1E4F

```
  H    L
| 1E | 4F |
                 |      |
   junior -----> |  4F  |  4105
   senior -----> |  1E  |  4106
                 |      |
```

In other words, the least significant or "junior" byte in the register is loaded into the specified address and the most significant or "senior" byte is loaded into the byte following this.

If you have any machine code subroutines/tips/games, please send them to Machine Code, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF

Reproduced from *Machine Code and better Basic* by Ian Stewart and Robin Jones (price £7.50) by kind permission of Shiva Publishing Ltd, 4 Church Lane, Nantwich, Cheshire CW5 5RQ

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

POISED FOR ACTION ON SEIKOSHA

Stephen Yu of Kettering, Northants writes

Q **I have just purchased a Seikosha GP 100 printer for my BBC model B microcomputer. But I have the following problem. How do I get the (£) symbol onto my printer? However hard I try all I can get is the (') symbol.**

A The problem is one of coding. The £ symbol is more or less unique to this country and therefore does not have a place in the ascii standard. Instead, it is put in at one of the code numbers not allocated by the ascii standard. On the BBC (and the Spectrum, and the Ace incidentally) it has been put in at number 96.

However, on the Seikosha the £ sign has been put in at number 185. Therefore every time you want to use the £ sign you should call the character at *Code* 185, when the computer is calling the character at 96. The only way round this is to write a procedure that will read all the input to check for a *Code* 96 entry and to replace it on the printer with a 185. The following routine can be quite tedious but it will do the job.

```
DEF PROC conv
PRINT A$
FOR P=1 TO LEN A$
VDU 1
IF MID$ (A$,P,1)="£" THEN PRINT CHR$ 185 ELSE PRINT MID$ (A$,P,1)
NEXT P
END PROC
```

PLANNING FOR CONVERSION

Paul Ferns of Coopers Cray Hill, London, writes

Q **I have a Vic20 and am very pleased with it. But now, after nearly a year, I think I want to go on to a better computer. The one I am interested in is the new Commodore 64. But, the problem is that I have a lot of software for my Vic20. I would like to know if I can use it on a Commodore 64 if I bought one.**

A In short, the answer is no. However a reader from Birmingham, Mr McCann, has sent us a letter he recently received from Commodore telling him that there are plans to make a conversion available to up-rate the Vic20 to a Commodore 64. The letter from Commodore is labelled 'Preliminary Information Subject to Change'. However, it is hoped that more details will be available before Christmas.

ABANDONING BASIC FOR FORTH

Mr A Cranston of Upton Road, Slough, writes

Q **I have an interest in the new Jupiter Ace, and I think it is set to cause much excitement. I would like to know more about its language Forth. I was hoping that you could refer me to some books that would introduce me to Forth.**

Also, is it true that the Ace will be compatible with the Sinclair 16K Ram pack?

A I think you are right about the amount of interest the Ace has engendered, though it still remains to be seen just how many people will take the plunge and abandon Basic. I feel it would be safest to recommend two of the books that are mentioned in the provisional instructions to the Ace, namely, 'Discover Forth' by Tom Hogan (published by Osborne/McGraw-Hill) and 'Introduction to Forth' by Ken Kencht (published by Howard W Sams).

The book that is placed as the best choice to look at is 'Starting Forth' by Leo Brodie (published by Prentice Hall). Unfortunately, I have not been able to track down a copy at the time of writing, so I cannot say what it is like.

I think a lot of people heard the rumour that the ZX81 Ram pack was going to be compatible with the Ace, and maybe other ZX peripherals as well. However, the ZX81 Ram pack will have to be modified before it can be used with the Ace.

WRITING FOR JOYSTICK USE

Susan Wallis of Garth Road, Morden writes

Q **A friend of mine is selling his Atari video games machine to buy a computer. He says that his Atari joysticks will work on my Vic. I tried them and they did. I would like to know if it is OK to use them, or will they damage my computer? Also, how do you write programs that use the joystick for moving something on the screen?**

A The Atari and Vic joysticks are the same, apart from the packaging. You should have no problems using them on your Vic. As for incorporating them into your programs, we did an article on that subject in our October 14 issue.

MACHINE-CODE ON NON-STANDARD CHIP

Mr A Doodes of Hainault Road, Leytonstone, London E11, writes

Q **I have recently bought a Sharp PC-1500. While I find the machine interesting and fun, I must admit that I find the manual pretty abysmal. However, while playing around I have discovered that the computer does in fact have *Peek*, *Poke* and *Call*, functions built into the Basic. In other words, it is possible to write user machine code programs on it.**

However, I do not know what the CPU is. The manual merely refers to a CMOS 8-bit chip. Some reading around and a few experiments convinces me that it is not a 6502, but what is it? Do you know where I can get hold of a suitable book to learn the machine code?

A I am afraid that you are going to have to wait. The chip is an 'in house' design that is not used anywhere else. It is, as you rightly say, built around a CMOS 8-bit chip, but that is almost all that is known at the moment. Or rather that is all the information that has been released in this country to date.

The parent company in Japan still has the copyright on the chip and its mnemonics. It is unlikely that they will publish details yet. I was told that at a *rough guess* it will be about 4-6 months before the details are available over here.

The details have already been published in Japan, in Japanese! A book on the subject is available over there and is awaiting translation now.

I must be honest and say that machine code is enough for me to get to grips with. The thought of having to master it on a non-standard chip in Japanese, is a prospect that I personally do not relish. So I can only advise you to wait, and keep an eye on the computer press for further developments. All you can do until then is *Poke* around inside the memory and see if you can learn anything that way.

SEND IT BACK TO SINCLAIR

Rupert Atkinson of Gaverston Road, Leamington Spa, Warwickshire writes

Q **I have recently obtained my Spectrum and I have a problem with it. After about half an hour the display freezes and everything stops. No amount of key pressing will bring it back to normality. I have to remove the power supply and reset the computer. But this is happening with increasing regularity.**

Should I send it back to Sinclair, or is there an easy way to solve this problem?

A This sounds very like the initial design flaw that halted the Spectrum when it was first launched. The flaw was a clash between the ULA and the Z80a, where they both try and use the same data bus at the same time. Perhaps you have an old machine that slipped through the net, or one in which the modification to rectify this error (a Nand gate added) has not been done properly.

However much you dread the thought, I can only suggest that you send your computer back to be repaired under the guarantee.



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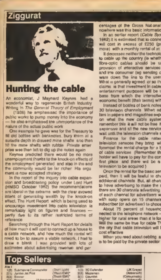
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Ziggurat



Hunting the cable

An economist, J Maynard Keynes had a wonderful way to regenerate British Industry. Writing in *The General Theory of Employment* (1936) he emphasised the importance of public works to pump money into the economy — he also emphasised the unimportance of the nature of the actual public work.

One example he gave was for the Treasury to fill old bottles with banknotes, bury them at a suitable depth in disused mine shafts and then fill the mine shafts with rubble. Private enterprise was then left to dig up the notes again.

Keynes predicted there would be no more unemployment thanks to the knock-on effects of the employment generated and also in the end the community would be far richer. His argument is now accepted strategy.

In the report of the inquiry into cable expansion and broadcasting policy under Lord Hunt (HMSO October 1982) the recommendations are liberal in the extreme with the clear avowed intent of generating wealth by the knock-on effect. The Hunt Report which is being used to encourage investment into cable television is remarkably light on figures and finances — partly due to its rather restricted terms of reference.

Searching through the Hunt Report for details of how much it will cost to connect up a house to a cable network, and how much the rental will need to be to assure a viable network, I had to draw a blank. I was provided with lots of estimates about advertising revenue and percentages of the Gross National Product but nowhere was this basic information given.

In an earlier report (*Cable Systems* HMSO, 1982) it is estimated that to connect up a house will cost in excess of £250 (probably much more) with a monthly rental of at least £25.

It discusses neither the technology to be used to cable up the country (ie whether co-axial or fibre-optic cables should be used) nor the provision of interactive services for business and the consumer (eg sending computer software down the line to the user's computer). What is generally agreed or so the Hunt Report claims is that investment in cable television for entertainment purposes will be the necessary base from which the interactive services of economic benefit (their terms) will be built up.

Instead of bottles of bank notes there will be 30 television channels. When editors and writers in papers and magazines expound at length on what the new cable systems will bring, remember this: it will not be free. It will be rather expensive and all the new services will have to wait until the television channels are viable.

Finance for the cable network and the television services they bring will be first and foremost the rental charge for a basic package of cable services. (Remember that the householder will have to pay for the connection in the first place and there will be a new type of television to be acquired.)

Once the rental for the basic service has been paid, then it will be lawful to charge extra for additional channels. But, all channels will have to have advertising to make the system pay. If there are 30 channels advertising the attraction of each channel for advertisers will diminish — with soap opera on 15 channels how is the subscriber (or advertiser) to choose?

About 75 percent of households are connected to the telephone network — the figure is higher for rural areas than it is for urban areas. Will the same be true for cable TV? And it is in the city that cable television will be at its most cost effective.

When you read about cabling and hear that it is to be paid by the private sector that's you ■

Boris Allen

Puzzle

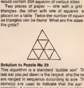
A coven to set you square

Puzzle No 34

In the diagram, 13 possible triangles can be formed. The total number of triangles in a grid of any size is given by the formula $T = N(N+2)(2N+1)/8$ where N is the number of rows. Any remainder left after the division is ignored.

The formula for finding out the number of squares in a square grid is $T = N(N+1)(2N+1)/6$. So for example an 8 × 8 chessboard would contain 204 squares of various sizes.

Two pieces of paper — one with a grid of triangles, the other with one of squares are placed on a table. Twice the number of squares as triangles can be found. What are the sizes of the grids?



Solution to Puzzle No 29

This algorithm is a standard 'bubble sort'. The last ear you put down is the largest and the rest are ranged in sequence according to size. The stone(s) are used to indicate that the sort is complete. A program to sort out ears could be

```
10 DIM E(n)
20 FOR A = 2 TO n
30 IF E(A) < E(A - 1) THEN LET B = E(A): E(A) =
   E(A - 1): E(A - 1) = B: S = 1
40 NEXT A
50 IF S <> 0 THEN S = 0: GOTO 20
60 STOP
```

Winner of Puzzle No 29

The winner is Alan Honey, Endcliffe Vale Road, Sheffield who receives £10

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1(2)	Submarine Commander	(Thorn EMI)*
2(1)	Jumbo Jet Pilot	(Thorn EMI)*
3(3)	Soccer	(Thorn EMI)*
4(4)	Preppie	(Adventure International)
5( )	Choplifter	(Broderbund Software)†
6( )	Dragon's Eye	(Epyx)†
7(8)	Shamus/Billiards	(Thorn EMI)
8( )	PacMan	(Atari)*
9( )	Shamus	(Synapse)
10( )	Centipede	(Atari)*

*Cartridge †Disc only

(Figures compiled by Calisto Computers, Birmingham, 021-632 6458)

ZX Spectrum

1(7)	Maze Man	(Abbersoft)
2( )	Spectral Invaders	(Bug-Byte)
3( )	Spectres	(Bug-Byte)
4(2)	Escape	(New Generation)
5( )	Arcade pack	(Central Technology)
6(4)	Star Trek	(Chromasoft)
7( )	Football Manager	(Addictive Games)
8( )	Adventure 1	(Abbersoft)
9(4)	Spectrum Chess	(Artic)*
10(5)	Gulpman	(Campbell Synapse)

*Requires 48K.

(Figures compiled by Buffer Micro Shop, London, 01 769 2887)

ZX81

1(3)	3D Defender	(JK Greye)
2(8)	Mazeman	(Abbersoft)
3(1)	Gauntlet	(Calsoumatic)
4( )	Adventure 1	(Abbersoft)
5( )	Mazogs	(Bug-Byte)
6(9)	Chess	(Artic)
7(2)	Frogger	(DJL Software)
8( )	Trader	(Pixel)
9( )	Football Manager	(Addictive Games)
10(5)	Gulp II	(Campbell Systems)

*All require 16K Ram.

(Figures compiled by Buffer Micro Shop, London, 01 769 2887)

Vic

1	(8) Grid Runner	(Llamasoft)
2	(2) Defenda	(Llamasoft)†
3	( ) Myriad	(Rabbit)††
4	(10) Scramble	(Rabbit)
5	(–) Adventureland	(Commodore)*
6	(9) Jelly monsters	(Commodore)*
7	(1) Sargon II Chess	(Commodore)
8	(–) Pirates Cove	(Commodore)
9	(4) Blitz	(Commodore)
10=	(7) Star Battle	(Commodore)
10=	(8) Traxx	(Llamasoft)†

*Cartridge †Requires 8K or 16K ††3K.

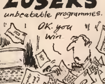
(Figures compiled by the Vic Centre, London, 01 992 9904)

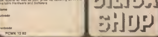
Books

1(2)	ZX Spectrum Explored *Hartnell*	(Sinclair/Browne)
2(8)	BBC Micro Revealed *Ruston*	(Interface)
3(5)	Easy Programming for the ZX Spectrum *Stewart and Jones*	(Shiva)
4(7)	Over the Spectrum, various authors	(Melbourne House)
5(8)	Z80 Assembly Language Programming, *Leventhal*	(Osborne)
6(3)	Programming the 6502, *Zaks*	(Sybex)
7(1)	Starting Forth *Brodie*	(Prentice Hall)
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9( )	The ZX Spectrum and how to get the most from it *Sinclair*	(Granada)
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